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Decomposing the Labour Supply Response to Spousal Death: Evidence from a Dynamic Event–Study Design

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Decomposing the Labour Supply Response to Spousal Death: Evidence from a Dynamic Event–Study Design

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Abstract

This paper provides a first dynamic decomposition, within a cohort-stacked event study framework, of labour supply adjustments following spousal death into extensive (participation) and intensive (hours) margins. Using longitudinal data from the Survey of Health, Ageing and Retirement in Europe (SHARE), I analyse individuals aged 55–75 to examine how bereavement shocks translate into labour supply shifts in later life. The results indicate that labour supply does not increase immediately but instead rises gradually, beginning approximately one year after bereavement. This adjustment is driven almost entirely by the extensive margin—specifically labour market re-entry—rather than by adjustments in hours among those already employed. Furthermore, I find that both the timing and magnitude of these responses are jointly shaped by shock characteristics and institutional context. Predictable deaths trigger stable, participation-centred adjustments from the short run, whereas responses to sudden deaths appear delayed and less stable over event time. Regional comparisons reveal that institutional environments, such as labour market flexibility and social protection structures, condition which adjustment margins are feasible. These findings suggest that labour supply at older ages adapts to household shocks primarily through discrete participation shifts, shaped by the nature of the shock and available institutional pathways.

Keywords: labour supply; spousal death; older workers; SHARE data; event-study design; extensive and intensive margins

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1. Introduction

Spousal death constitutes a major household shock that simultaneously involves income loss, increased caregiving responsibilities, and emotional distress. For the surviving spouse, these changes create strong incentives to adjust labour supply. Spousal death is not a single economic event but a multidimensional shock that unfolds within a broader life-cycle and institutional context. As a result, labour supply responses may operate through overlapping economic and non-economic channels.

The labour supply literature has traditionally analysed household adjustments to economic shocks such as job loss or income reductions [1,2]. Within this framework, responses to a spouse's income loss are often interpreted through the lens of the added worker effect, whereby secondary earners increase labour supply to offset household income declines [3,4]. This literature has primarily focused on average labour supply responses and on how the generosity of social insurance attenuates such adjustments [5].

A separate strand of research examines the consequences of spousal death directly. This literature primarily focuses on economic and institutional outcomes, documenting how bereavement affects retirement behaviour, household resources, and labour market exit decisions, often in interaction with pension and social security incentives (e.g., [6,7]). While these studies provide important evidence on average retirement timing and labour market withdrawal following spousal death, they offer limited insight into how surviving spouses adjust labour supply dynamically over time or through specific adjustment margins.

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Recent work has emphasised the importance of event-time dynamics and of distinguishing adjustment margins. Fadlon and Nielsen [8] document a non-monotonic pattern following spousal death, with short-run increases in labour supply followed by medium-run declines as health and emotional channels intensify. Braun and Stuhler [9] show that labour supply responses vary substantially across age groups when combined with life-cycle constraints. Cross-country analyses further highlight that institutional environments shape both the timing and intensity of labour supply responses [10], while studies of institutional reforms demonstrate that adjustment paths depend on policy context [11]. Related work on caregiving burdens and time allocation underscores that labour supply responses reflect the interaction of multiple mechanisms rather than a single channel [12,13].

Despite these advances, three gaps remain. First, existing studies provide limited decomposition of post-shock labour supply adjustments into changes in labour force participation (the extensive margin) versus changes in weekly working hours (the intensive margin) among the employed. Second, there is little evidence on how shock characteristics—particularly death predictability, distinguishing sudden from predictable deaths—interact with household resources and institutional environments to shape adjustment paths over event time. Third, multinational analyses that compare labour supply responses on a common event-time scale while accounting for institutional heterogeneity across European countries remain scarce.

These gaps are particularly salient for individuals aged 55–75, a transitional life-cycle stage in which health shocks, caregiving responsibilities, labour supply decisions, and pension take-up often overlap. While prior studies acknowledge heterogeneity across age groups, a systematic analysis of how labour supply adjustments form through distinct mechanisms at different points in event time remains lacking.

This paper addresses these gaps along three dimensions. Methodologically, it decomposes labour supply adjustments following spousal death into extensive and intensive margins within an event-time framework, providing a dynamic account of adjustment pathways. Second, it examines how death predictability, household characteristics, and national institutional environments interact with these margins. Third, by applying a common analytical design across multiple European countries, the study directly compares how institutional heterogeneity shapes both the magnitude and timing of labour supply responses to spousal death.

By doing so, the analysis provides empirical evidence that integrates the added worker effect with care-, health-, and emotion-related pathways—mechanisms that are often examined separately in the existing literature—within a unified framework of labour supply adjustment. (The details of the decomposition methodology are provided in Section 3.2 and Appendix C.2.2.)

2. Data and Empirical Setting

2.1. Data Source and Event-Time Panel Construction

This paper uses data from the Survey of Health, Ageing and Retirement in Europe (SHARE) Waves 1, 2, 4–6, and 8–9 [14], a longitudinal survey that repeatedly tracks adults aged 50 and older across European countries. SHARE provides rich and harmonized information on individuals' health, labour supply, income, pensions, and household composition. In addition, a dedicated mortality module records the year and month of death as well as the cause of death.

A key advantage of SHARE for the purposes of this study is that it reports both the interview year and month and the year and month of death. Using the difference between the interview date and the date of death, this paper constructs individual event time τ in months and aggregates it into annual event-time categories. This procedure aligns pre- and post-bereavement observations on a common time axis and allows for a coherent analysis of labour supply dynamics surrounding spousal death (see Appendix A.2 for details).

This event-time construction is necessary because, despite the biennial interview structure, the relative timing of death and interviews varies substantially across individuals. Defining event time

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based on calendar dates, rather than survey waves, overcomes this limitation and ensures comparability of dynamic responses across cohorts.

Prospective mortality information is available in Waves 2, 4–6, and 8–9. While no spousal deaths are observed in Wave 1, observations from Wave 1 are retained to construct pre-event baseline outcomes for individuals whose spouse dies in later waves. Waves 3 and 7 are excluded due to missing or retrospective mortality information. Cohorts defined by the year of spousal death are vertically stacked to form an event-time panel, following a cohort-stacked event-study design (see Appendices A.1–A.3 for details).

2.2. Sample Definition and Treatment Assignment

The sample is restricted to individuals aged 55–75. The treated group consists of individuals who experience spousal death during the survey period, with the timing of death defined as event time τ. Observations prior to spousal death are classified as pre-treatment, while observations thereafter are classified as post-treatment.

The control group consists of individuals who have not yet experienced spousal death or who never experience spousal death during the study period. Under the cohort-stacking design, individuals contribute observations to the control group prior to treatment and transition into the treated group thereafter. To enforce common support, the control group is restricted to individuals sharing the same gender, five-year age group, and survey region as treated individuals. The final sample comprises 97,409 individuals, of whom 2,175 experience spousal death during the study period. Baseline characteristics are reported in Tables B.1–B.3 in Appendix B.

3. Empirical Strategy and Identification

This section describes the empirical strategy and the key identification assumptions used to estimate the causal effects of a spousal death shock on labour supply. We sequentially present the event-time-based difference-in-differences (DID) design, the baseline event-study DID specification, and the identifying assumptions underlying the analysis.

3.1. Event-Study DID Specification

3.1.1. Baseline Event-Study DID Specification

To estimate the dynamic effects of a spousal death shock on labour supply, this study adopts an event-time difference-in-differences (DID) framework. The analysis compares changes in labour supply outcomes relative to the timing of spousal death, with the baseline specification given by:

$$Y_{it} = \sum_{\tau \neq -1} \beta_\tau D_{i\tau} + X_{it}'\gamma + \mu_i + \lambda_t + \varepsilon_{it}. \tag{1}$$

where $D_{i\tau}$ is an indicator variable equal to one if individual i is observed at event time τ, defined as τ years before or after the spousal death shock. In event-study models, one event-time category must be omitted as the reference period. Following standard practice in the literature [8,15,16], this paper normalises the coefficients at $\tau = -1$, corresponding to the year immediately preceding spousal death. This choice uses the stable pre-shock period as the comparison benchmark and is also consistent with the identification constraints required to avoid multicollinearity between fixed effects and event-time indicators in stacked event-time panels.

The event-time coefficients β_τ represent the average change in labour supply at event time τ relative to the baseline period $\tau = -1$. Coefficients for the pre-event period ($\tau < 0$) provide a direct test of the parallel trends and quasi-exogeneity assumptions, assessing whether systematic changes in labour supply precede the spousal death shock. In contrast, coefficients for the post-event period ($\tau \geq 0$) capture the dynamic effects of spousal death on labour supply outcomes. Because anticipatory behaviour may arise immediately prior to spousal death due to deteriorating health or increasing caregiving burdens, the stability of the pre-event coefficients constitutes a critical identification check in this setting.[1]

The outcome variable Y_{it} represents individual labour supply measures, including labour force participation, weekly working hours, and annual labour income. The vector X_{it} includes demographic, household composition, and economic control variables. Individual fixed effects (μ_i) absorb time-invariant individual characteristics, such as preferences, abilities, and country-specific factors, allowing identification to rely on within-individual changes before and after spousal death.[2] Time fixed effects (λ_t) control for aggregate shocks common to all individuals in a given year. Given irregular survey intervals and staggered treatment timing, we assess the robustness of the results using alternative specifications with more flexible time fixed effects, including year-by-month fixed effects, following concerns raised in the recent difference-in-differences literature [17,18].

Standard errors are clustered at the individual level. Failing to account for serial correlation in panel data can lead to downward-biased standard errors [19]. Clustering at the individual level follows the standard implementation of event-study difference-in-differences designs [20].

At the extremes of the event-time distribution, common support weakens due to a declining number of observations. Following the recent literature on staggered treatment timing and event-study identification [8,18,21], the analysis is restricted to the event-time window $\tau \in [-4, +4]$. This trimming procedure removes highly volatile intervals that rely disproportionately on a small number of cohorts, thereby stabilising the variance and improving the interpretability of the event-time coefficients. Detailed variable definitions and data construction and cleaning procedures are provided in Appendix A.6.

3.1.2. Control Group Composition and Identification Assumptions

In the event-study difference-in-differences (DID) design employed in this paper, the control group consists of individuals who have not yet experienced a spousal death shock at a given event time τ, including both individuals who never experience spousal death during the study period and those who experience it at a later point in time. Under the cohort-stacking design, the same individual contributes to the control group prior to spousal death and transitions into the treated group once spousal death occurs, allowing individuals with different treatment timing to be compared along a common event-time axis.

Identification relies on the parallel trends assumption: absent a spousal death shock, treated and control groups would have followed similar labour supply trajectories over event time. This assumption is assessed using pre-event event-time coefficients, which test for statistically significant or systematic labour supply trends prior to spousal death. The absence of such pre-event trends supports the validity of the identifying assumption underlying the event-study DID design.

To assess sensitivity to the composition of the comparison group and the construction of event time, we conduct a series of robustness checks, including specifications that restrict the control group to the not-yet-treated cohort, alternative event-time definitions, and placebo timing tests that assign artificial event dates. The results support the validity of the baseline event-study DID identification strategy.

3.2. Decomposition of Labour Supply Adjustments

The total effect of a spousal death shock on labour supply is observed as a change in unconditional weekly hours, defined as the product of employment status and weekly working hours. The total effect alone does not reveal through which adjustment channel this change occurs. Even for the same increase in total weekly working hours, the response may be driven either by non-workers entering or re-entering the labour market (the extensive margin) or by changes in weekly working hours among

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[1] As a robustness check, this paper conducts additional analyses using alternative normalisation schemes (e.g., $\tau = -2$ and the pre-event mean) to assess sensitivity to the choice of the reference period. The corresponding results are reported in the robustness analysis section (Section 6.3).

[2] Respondents do not change countries during the survey period; country fixed effects are absorbed by individual fixed effects.

already employed individuals (the intensive margin). In particular, prior research suggests that the added worker effect following spousal death may operate through different margins over the short and the medium-to-long run. Failing to distinguish this temporal structure inevitably leads to an incomplete interpretation of the total labour supply response.

This paper combines the standard decomposition framework from the labour supply literature [22,23] with the event-time difference-in-differences (DID) design to decompose, by event time, the contribution of each margin to changes in total weekly working hours following a spousal death shock. The change in unconditional weekly hours at event time τ, denoted by $\Delta E[H]_\tau$, can be expressed by the following identity:

$$\Delta E[H]_\tau \approx (\Delta p_\tau)h_0 + p_0(\Delta h_\tau), \tag{2}$$

where p_0 and h_0 denote labour force participation and average weekly working hours among employed individuals in the period immediately preceding spousal death ($\tau = -1$), and Δp_τ and Δh_τ represent the relative changes estimated from the event-time DID model. The first term captures the contribution of the extensive margin, while the second term captures the contribution of the intensive margin. The baseline levels p_0 and h_0 are calculated as simple sample means and are independent of the estimation procedure. As a result, this decomposition re-expresses the baseline event-study estimates without introducing additional structural assumptions. A detailed derivation of the decomposition formula, the first-order approximation used in the empirical analysis, and the calculation of each component are provided in Appendix C.2.1.

The key contribution of this approach is that, unlike existing studies relying on static decompositions, it applies a dynamic decomposition aligned to event time. This allows direct identification of whether the added worker effect operates primarily through labour force participation responses or through adjustments in weekly working hours, and at which points in time these margins become relevant. By revealing the temporal structure of labour supply adjustments, the decomposition provides insights that are difficult to obtain from average total effects alone. Moreover, given the discontinuous survey structure of the SHARE data and the possibility of health deterioration immediately prior to spousal death, this approach helps mitigate the risk that pre-event changes are conflated with post-event margin-specific responses.

This decomposition also establishes a prerequisite for interpreting subsequent heterogeneity analyses. Differences in the predictability of the spousal death shock or in the institutional environment may alter both the relative importance and the timing of extensive and intensive margin adjustments. The next section examines how these factors conditionally shape the event-time paths of labour supply responses using an extended event-study DID framework.

3.3. Heterogeneous Event-Study Specification

The baseline event-time difference-in-differences (DID) specification in Section 3.1 identifies the average adjustment path following a spousal death shock, while the decomposition in Section 3.2 quantifies how this adjustment is composed through the extensive and intensive margins. These specifications do not explicitly allow for the possibility that adjustment paths may systematically differ across individuals, households, or institutional environments. Because both the magnitude and the timing of labour supply responses to a spousal death shock may vary with time-invariant structural factors—such as the predictability of death or the institutional environment—an extended specification is required to capture heterogeneous adjustment patterns over event time.

This section adopts an interacted event-study DID specification that incorporates interaction terms between event-time indicators and time-invariant heterogeneity measures. The estimation equation is given by:

$$Y_{it} = \sum_{\tau \neq -1} \beta_\tau D_{i\tau} + \sum_{\tau \neq -1} \gamma_\tau (D_{i\tau} \times Z_i) + X'_{it}\delta + \alpha_i + \lambda_t + \varepsilon_{it}. \tag{3}$$

Here, $D_{i\tau}$ denotes event-time indicators relative to the timing of spousal death, and Z_i represents time-invariant characteristics that may conditionally alter labour supply responses over event time. Examples of Z_i include indicators for the predictability of the spousal death shock and classifications based on national institutional regimes. The interaction term $D_{i\tau} \times Z_i$ allows these structural characteristics to generate differential responses at each event-time lag. The coefficients γ_τ capture the additional event-time-specific response of individuals with $Z_i = 1$ relative to the reference group at the same event time τ.

This specification preserves the identification structure of the baseline event-study DID model while allowing time-invariant heterogeneity to exert differential effects across event times. Moreover, by estimating both groups within a single regression framework, it enables a direct comparison of dynamic adjustment paths along a common event-time axis, offering greater estimation efficiency and interpretability than approaches that split the sample and estimate models separately.[3]

The implementation of the extended specification follows the same fixed effects and time control structure as in Section 3.1 to maintain consistency with the identification logic of the baseline model. Consistent with the baseline specification, individual and time fixed effects, as well as individual-level cluster-robust standard errors, are applied identically.

This extended model provides the basis for the subsequent analysis of how the predictability of the spousal death shock and institutional environments systematically shape labour supply adjustment patterns over the event-time path in the following sections.

4. Main Results

4.1. Pre-Event Trends and Identification Check

Before turning to the post-bereavement effects, this section examines the validity of the identification strategy underlying the event-study difference-in-differences (DID) design. Our identification relies on the parallel trends assumption, as well as the absence of anticipation effects prior to spousal death. Appendix Table C1 and Figure C.1 summarise labour supply patterns for the treated and control groups aligned by event time.

Figure C.1 plots unconditional average trajectories of labour force participation, log weekly working hours, and log annual labour income for both groups. A visual inspection of the pre-event period does not reveal systematic divergence between the treated and control groups across outcomes. In particular, there is no evidence that the gap between the two groups consistently widens or narrows in a specific direction prior to spousal death, suggesting broadly stable pre-event dynamics.

Appendix Table C1 reports the corresponding raw means underlying these trajectories. These descriptive statistics are intended as a diagnostic illustration rather than a formal statistical test of pre-event trends, as they do not condition on covariates or fixed effects.

A more rigorous assessment of pre-event trends is conducted in the subsequent section using the pre-event coefficients from the event-study DID regressions, which include individual and time fixed effects. These regression-based estimates provide the formal basis for evaluating the plausibility of the parallel trends assumption and serve as the primary diagnostic for our research design.

4.2. Event-Study Estimates

Figure 1 reports event-time coefficients estimated relative to the period immediately preceding spousal death ($\tau = -1$) for labour force participation, log weekly working hours, and log annual labour income.

[3] The interaction coefficient γ_τ represents the event-time-specific additional effect for the $Z_i = 1$ group relative to the $Z_i = 0$ group. The total event-time effect for the $Z_i = 1$ group is given by $\beta_\tau + \gamma_\tau$. Standard errors for this linear combination are computed using the delta method based on the variance–covariance matrix from the same regression.

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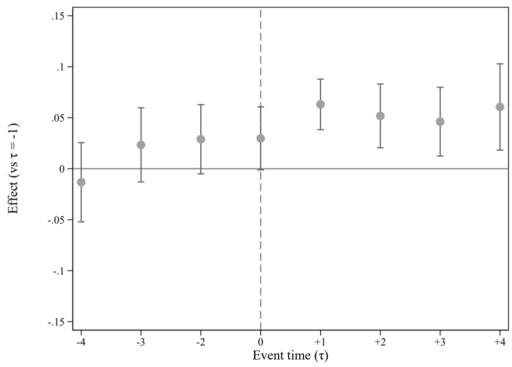
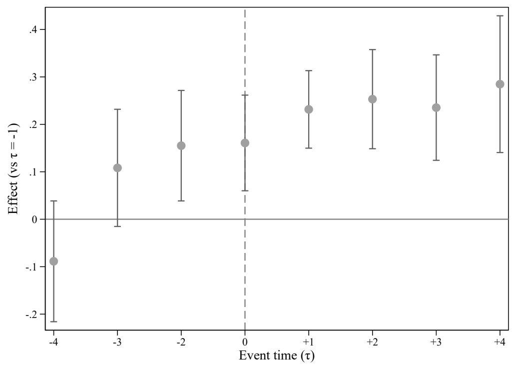
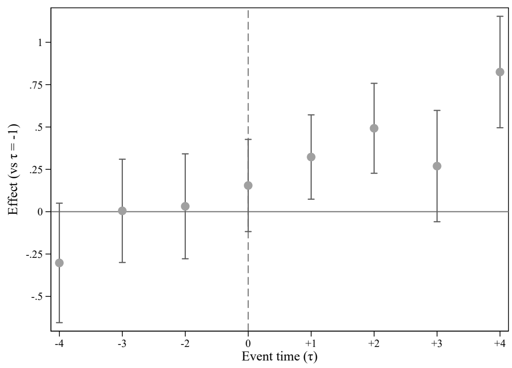


(**a**) Labour Force Participation



(**b**) Log Weekly Working Hours



(**c**) Log Annual Labour Income

Figure 1. Labour Supply Responses to Spousal Death: Event Study DID Estimates. *Notes:* Dots represent event-time regression coefficients β_τ, and solid lines indicate 95% confidence intervals. The reference period $\tau = -1$ is omitted, so all coefficients are interpreted relative to the pre-death period. All specifications include individual and time fixed effects, with standard errors clustered at the individual level. Control variables are included as described in Section 3.

During the pre-event period ($\tau < 0$), the estimated event-time coefficients for labour force participation and log annual labour income are generally small in magnitude and mostly statistically insignificant. For log weekly working hours, positive and statistically significant coefficients are observed at some pre-event lags; however, these estimates are modest in size and do not display a systematic or monotonic pattern as the event approaches.

By comparison, the post-event period ($\tau \geq 0$) exhibits discernible changes across all three labour supply measures. In the short run ($\tau = 0$ to $\tau = +1$), log weekly working hours increase relatively

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sharply, reaching approximately 0.23 log points at $\tau = +1$, corresponding to an increase of about 26 per cent relative to the pre-event period. Subsequently, labour force participation and log annual labour income follow a more gradual upward trajectory. Log annual labour income rises substantially and reaches approximately 0.49 log points by $\tau = +2$, with some variation in statistical precision across event times (see Appendix Table C2 for exact coefficient estimates). Labour force participation also displays a gradual but persistent increase following spousal death.

Overall, labour supply responses to a spousal death shock unfold at different points in event time, with observable differences in the timing of adjustments across weekly working hours, labour force participation, and annual labour income. The following section examines how these changes in total weekly working hours are decomposed into contributions from the extensive and intensive margins using the dynamic decomposition framework.

4.3. Labour Supply Adjustment Channels: Extensive vs. Intensive Margins

This section decomposes changes in unconditional weekly hours, $\Delta E[H]_\tau$, following a spousal death shock into contributions from the extensive and intensive margins using the standard decomposition framework introduced in Equation (2), where p_0 and h_0 denote labour force participation and average weekly working hours among employed individuals in the pre-death reference period ($\tau = -1$).

Table 1 reports changes in total weekly working hours by event time and the corresponding contributions of the extensive and intensive margins. Immediately after spousal death ($\tau = 0$), unconditional average weekly working hours increase by approximately 2.2 hours per week. This increase persists and gradually intensifies over subsequent event times, reaching about 3.4 hours by $\tau = +4$, with moderate non-monotonic variation across periods.

Table 1. Decomposition of Unconditional Weekly Hours after Spousal Death (Main Sample)

Event time	$\Delta E[H]_\tau$	Extensive margin ($\Delta p_\tau \cdot h_0$)	Intensive margin ($p_0 \cdot \Delta h_\tau$)
$\tau = 0$	2.215	1.125	0.634
$\tau = +1$	2.746	2.385	0.699
$\tau = +2$	3.017	1.958	0.880
$\tau = +3$	3.039	1.745	0.930
$\tau = +4$	3.413	2.289	0.864

Notes: This table reports a first-order decomposition of changes in unconditional weekly working hours, $\Delta E[H]_\tau$, into extensive and intensive margin components by event time. The extensive margin captures changes in labour force participation ($\Delta p_\tau \cdot h_0$), while the intensive margin captures changes in weekly working hours conditional on employment ($p_0 \cdot \Delta h_\tau$). Pre-death reference values are measured at $\tau = -1$, and all event-time changes are expressed relative to this baseline. Details on the decomposition methodology are provided in Section 3 and Appendix C.2.

The decomposition results indicate that the extensive margin accounts for the majority of the total adjustment in weekly working hours following spousal death, particularly in the immediate aftermath of the shock. At $\tau = 0$, approximately half of the increase in unconditional weekly hours is explained by increased labour force participation, with the remainder driven by higher conditional hours among those already employed.

From $\tau = +1$ onwards, the extensive margin becomes the dominant adjustment channel, contributing between roughly 60 and 85 per cent of the total increase in weekly hours, depending on the event time. While the intensive margin also contributes positively and remains economically meaningful throughout the post-event period, its relative importance is consistently smaller and does not exhibit a sustained upward trend.

To further characterise the nature of the extensive-margin response, supplementary descriptive evidence from the risk-set sample indicates that the participation increase primarily reflects labour market re-entry rather than first-time entry. More than 70 per cent of post-bereavement entrants accumulated over 20 years of prior work experience before their period of non-employment, suggesting that the observed extensive-margin adjustment corresponds largely to the return of previously attached workers. This pattern reinforces the interpretation of the extensive-margin response as a reactivation of existing labour supply capacity rather than sporadic or marginal entry into employment.

4.4. Discussion: Dynamic Adjustment Patterns

This section integrates the event-time patterns documented in Section 4.2 with the extensive–intensive margin decomposition results in Section 4.3 to characterise the dynamic process of labour supply adjustment following a spousal death shock. Taken together, the evidence points to a phased adjustment structure that can be broadly characterised by short-term, medium-term, and longer-term phases, with the relative importance of adjustment channels varying across these stages.

In the short term ($\tau = 0$ to $\tau = +1$), unconditional weekly working hours increase immediately following spousal death. At $\tau = +1$, log weekly working hours rise by approximately 0.23–0.24 log points, corresponding to an increase of about 27 per cent relative to the pre-event period. The decomposition results show that this increase in total weekly hours—amounting to roughly 2.7 hours per week at $\tau = +1$—is driven primarily by changes in labour force participation. Specifically, the extensive margin accounts for around two-thirds to three-quarters of the total adjustment in the short run. This pattern suggests that immediate labour supply responses are dominated by labour market entry or re-entry rather than by increases in working hours among those already employed.

In the medium term ($\tau = +2$ to $\tau = +3$), labour force participation continues to rise, although at a more moderate pace. During this phase, the intensive margin contribution gradually increases before stabilising, while participation remains the dominant adjustment channel. These dynamics indicate that medium-term labour supply adjustment remains centred on participation responses, complemented by incremental increases in weekly working hours among employed individuals.

By the longer term ($\tau = +4$), both labour force participation and weekly working hours stabilise at elevated levels, with their combined contributions generating substantial gains in labour income. At this horizon, log annual labour income increases by approximately 0.83 log points, corresponding to an increase of about 125 per cent. While the extensive margin continues to account for the majority of the adjustment, the intensive margin becomes increasingly important, consistent with a longer-term adjustment phase in which initial participation responses are reinforced by higher conditional hours.

Overall, the phased adjustment structure documented here is consistent with mechanisms emphasised in the added worker effect literature, which highlights short-run labour supply responses followed by more persistent participation adjustments. In older populations, however, adjustments in weekly working hours among incumbent workers may be constrained by health limitations and institutional factors. In this context, labour market entry or re-entry among surviving spouses who were previously economically inactive appears to be a particularly important adjustment channel following spousal death.

At the same time, participation-centred adjustment is unlikely to operate uniformly across all bereavement situations. Labour supply responses may vary with pre-death health trajectories and caregiving burdens, and the feasibility of labour market entry after spousal death may depend on institutional settings. These considerations motivate the heterogeneity analyses by shock predictability and institutional context presented in the subsequent section.

5. Heterogeneity Analysis

5.1. Conceptual Framework for Heterogeneity

As documented in the preceding section, labour supply adjustment following a spousal death shock unfolds, on average, around an expansion in labour force participation. While bereavement may appear as a uniform event, the effective shock experienced by the surviving spouse can differ substantially depending on the health trajectory prior to death, the accumulation of caregiving and financial burdens, and the institutional environment in which adjustment takes place. These differences are not fully captured by average effects alone.

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To more precisely understand how a spousal death shock is transmitted into labour supply responses, it is necessary to distinguish structurally relevant sources of heterogeneity. While multiple dimensions of heterogeneity may be present, this paper focuses on two key dimensions that are central for understanding when and under what conditions participation-centred adjustment is amplified or constrained.

The first dimension relates to the nature of the shock itself, capturing how the death occurred and the extent to which burdens accumulated prior to death. The second dimension reflects structural constraints imposed by the institutional environment, which shape the scope and feasibility of labour supply adjustment after the shock. Together, these dimensions characterise both the internal composition of the shock and the external conditions governing post-shock adjustment, making them well suited for explaining heterogeneity in adjustment pathways.

Death type captures the nature of the spousal death shock. Some deaths follow a prolonged deterioration of health, during which medical expenditures, caregiving responsibilities, and income reductions may accumulate gradually prior to death. In such cases, adjustment needs may form before the event, and the informational content of the shock is relatively high. By contrast, sudden deaths occur abruptly and with little warning, lacking a pre-event adjustment path and potentially limiting or obscuring short-term responses. Distinguishing death types is therefore essential for identifying how the shock's progression influences the timing, intensity, and persistence of labour supply adjustments.

The second dimension concerns the institutional environment, summarised by regional groupings. European countries differ markedly in pension systems, employment flexibility at older ages, social insurance and care infrastructure, and family-based care norms. These institutional features substantially condition both the speed and the extent to which surviving spouses can adjust their labour supply following bereavement. The regional classification used in the SHARE data—Nordic, Western/Central Europe, Southern Europe, and Eastern Europe—is designed to reflect these institutionally grounded differences in a structural manner.

For these reasons, this chapter examines heterogeneity in labour supply responses along two key axes: death type, which captures the intrinsic nature of the spousal death shock, and region, which reflects the institutional environment in which adjustment occurs. Distinguishing these dimensions allows for a clearer characterisation of structural adjustment patterns that are difficult to identify using average effects alone.

5.2. Heterogeneity by Type of Spousal Death

5.2.1. Classification of Death Types

Spousal death is observed as a single event, yet the health trajectory leading up to death—and the associated accumulation of medical expenditures, caregiving burdens, and income losses—varies substantially across individuals. The medical and public health literature has long emphasised the highly heterogeneous nature of these pre-bereavement trajectories. In particular, Lunney et al. [24] classify patterns of functional and medical decline prior to death into four distinct trajectories: sudden death, terminal illness, organ failure, and frailty. They show that even for the same underlying cause of death, the nature of the shock experienced by surviving family members can differ markedly depending on the individual's specific path to death. This insight suggests that understanding the shock of death requires considering not only the cause itself, but also the trajectory leading up to it.

A similar emphasis appears in the economics literature, where the pre-shock trajectory is recognised as a key determinant of post-shock adjustment mechanisms. Fadlon and Nielsen [8] show that anticipatory behaviours and expectations prior to bereavement can generate non-parallel pre-event trends between affected and unaffected households, implying that observed labour supply responses may partly reflect pre-death dynamics. Furthermore, while Coile [25] focuses on non-fatal health shocks, her findings underscore that the severity of a functional shock—often proxied by losses in activities of daily living (ADLs)—plays a central role in shaping spousal labour supply responses.

For this reason, this paper adopts a composite classification that combines cause of death with information on illness duration and prior medical utilisation. Deaths due to causes with medically

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defined sudden trajectories are classified as sudden deaths only if there is virtually no prior medical utilisation or if illness duration is shorter than one month. All remaining deaths are classified as predictable deaths (see Appendix D.1).

5.2.2. Event-Study Estimates by Death Type

Table 2 and Appendix Table C5 show that the event-time path of labour supply responses following spousal death differs systematically by death type. In particular, labour supply adjustments emerge more quickly and evolve more smoothly in the case of predicted deaths, whereas responses appear more delayed and heterogeneous following sudden deaths.

For predicted deaths, labour force participation increases in the immediate post-spousal death period and becomes statistically significant by $\tau = +1$ (0.059). The participation response remains positive and statistically significant through the medium term ($\tau = +2$ to $\tau = +4$), with estimates ranging from about 0.045 to 0.054. Log weekly working hours rise sharply and persistently following bereavement, with statistically significant increases observed from $\tau = 0$ onwards (e.g. 0.216 at $\tau = +1$ and 0.287 at $\tau = +4$). Log annual labour income increases more gradually, becoming statistically significant in the post-event period and reaching 0.826 by $\tau = +4$. Taken together, these patterns indicate a sustained and internally consistent adjustment process across labour force participation, weekly working hours, and annual labour income following predictable spousal death.

Table 2. Event-Study Estimates by Death Type

	$\tau = 0$	$\tau = +1$	$\tau = +2$	$\tau = +3$	$\tau = +4$
Panel A. Labour Force Participation Rate					
Predicted	0.024	0.059 ***	0.045***	0.051***	0.054**
Sudden	0.049	0.032	0.032	0.104*	0.138
Panel B. Log Weekly Working Hours					
Predicted	0.141***	0.216***	0.230***	0.243***	0.287***
Sudden	0.121	-0.070	-0.012	0.301	-0.319
Panel C. Log Annual Labour Income					
Predicted	0.130	0.304**	0.450***	0.304*	0.826***
Sudden	-0.033	-0.015	-0.247	0.507	0.286

Notes: Event-study DID estimates by death type. Coefficients are normalised at $\tau = -1$. All specifications include individual and wave fixed effects, with standard errors clustered at the individual level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Interpretation of the sudden-death estimates warrants caution given the relatively small size of the acute-death subsample, which limits statistical precision at individual event-time horizons. Across outcomes, coefficients for sudden deaths are characterised by larger standard errors and greater temporal variability than those observed for predicted deaths. In the immediate post-spousal death period ($\tau = 0$ to $\tau = +1$), no statistically significant changes are detected at conventional levels for labour force participation, weekly working hours, or annual labour income. At later horizons, however, a statistically significant increase in labour force participation is observed at $\tau = +3$ (0.104), suggesting that labour supply responses to sudden deaths may materialise only with a delay. By contrast, estimates for weekly working hours and labour income remain imprecisely estimated throughout the post-event period and exhibit substantial variation in sign and magnitude across event times.

Comparing the two death types therefore reveals differences not only in the magnitude of labour supply responses but also in their timing and stability. While labour supply adjustments following predicted deaths emerge early and follow a relatively smooth and persistent trajectory, responses associated with sudden deaths appear delayed and less systematic over event time. Overall, the results demonstrate that the dynamic path of labour supply adjustment after spousal death varies substantially with the predictability of the death shock. The interpretation of these differences and the underlying adjustment mechanisms are discussed in the subsequent sections.

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Table 3. Decomposition of Labour Supply Responses by Death Type

Event Time (τ)	$\Delta E[H]_\tau$	Extensive ($\Delta p_\tau \cdot h_0$)	Intensive ($p_0 \cdot \Delta h_\tau$)	Extensive Share
Panel A. Predicted Deaths				
$\tau = 0$	2.155	1.013	0.474	0.681
$\tau = +1$	2.791	2.323	0.693	0.770
$\tau = +2$	3.006	1.816	0.943	0.658
$\tau = +3$	3.153	1.938	0.865	0.691
$\tau = +4$	3.470	2.071	0.851	0.709
Panel B. Sudden Deaths				
$\tau = 0$	0.051	2.022	0.754	0.728
$\tau = +1$	-1.449	1.223	0.910	0.573
$\tau = +2$	-1.305	1.451	1.525	0.488
$\tau = +3$	2.295	3.975	0.865	0.821
$\tau = +4$	-3.691	4.906	0.851	0.852

Notes: This table reports a first-order decomposition of changes in unconditional weekly working hours by death type and event time. All quantities are normalised relative to $\tau = -1$. The extensive share is defined as $(\Delta p_\tau \cdot h_0)/\Delta E[H]_\tau$.

5.2.3. Decomposition into Extensive and Intensive Margins

The preceding analysis demonstrated that both the magnitude and the timing of labour supply responses to spousal death vary systematically by the type of death shock. This section examines the adjustment channels underlying these differences by decomposing the unconditional change in weekly working hours, $\Delta E[H]_\tau$, into the extensive-margin component $(\Delta p_\tau \cdot h_0)$ and the intensive-margin component $(p_0 \cdot \Delta h_\tau)$.

Table 3 reports $\Delta E[H]_\tau$ by event time and the corresponding contributions of the two margins for predictable and sudden deaths (see Appendix Table C6 for additional detail). For predictable deaths, unconditional weekly working hours increase immediately following bereavement and remain positive throughout the post-event horizon. Specifically, $\Delta E[H]_\tau$ rises from 2.155 hours at $\tau = 0$ to 2.791 hours at $\tau = +1$, and continues to increase steadily, reaching 3.470 hours by $\tau = +4$. Across all post-event periods, the extensive margin accounts for the majority of the total adjustment, with its share ranging between 0.658 and 0.770. The intensive margin also contributes positively at all horizons, but remains smaller in magnitude, increasing from 0.474 hours at $\tau = 0$ to around 0.85–0.94 hours in the medium to longer run.

In contrast, adjustment patterns following sudden deaths are markedly more volatile. Although the extensive-margin component is positive at all post-event horizons, the total change in weekly hours, $\Delta E[H]_\tau$, varies substantially in both magnitude and sign. The total response is close to zero at $\tau = 0$ (0.051 hours), turns negative at $\tau = +1$ (-1.449) and $\tau = +2$ (-1.305), becomes positive at $\tau = +3$ (2.295), and is strongly negative again at $\tau = +4$ (-3.691). This instability reflects the fact that large and positive extensive-margin contributions are frequently offset by intensive-margin adjustments, resulting in highly variable net effects. As a consequence, the implied extensive share fluctuates sharply over event time, ranging from 0.488 to 0.852, indicating the absence of a stable and systematic adjustment pathway following sudden deaths.

Taken together, these results reveal a clear contrast in labour supply adjustment mechanisms across death types. Following predictable deaths, increases in unconditional weekly working hours emerge immediately and evolve in a smooth and persistent manner, with the bulk of the adjustment consistently driven by the extensive margin. Following sudden deaths, by contrast, total labour supply responses are highly unstable over event time, and the relative contributions of the extensive and intensive margins vary substantially, suggesting a less coordinated and more heterogeneous adjustment process.

5.2.4. Discussion

The predictability of a spousal death shock generates pronounced differences in both the timing and the mechanisms of labour supply adjustment among surviving spouses. Tables 2 and 3 jointly show that not only the magnitude but also the stability and composition of post-bereavement labour supply responses differ fundamentally between predictable and sudden deaths.

For predictable deaths, labour supply adjustments emerge promptly and evolve in a stable and cumulative manner. Labour force participation increases significantly beginning at $\tau = +1$ and remains elevated throughout the subsequent event-time horizon. Weekly working hours and labour income display a similarly persistent upward trajectory. The decomposition results indicate that roughly two thirds to three quarters of the increase in unconditional weekly working hours (approximately 65–77 per cent) is consistently accounted for by the extensive margin, reflecting labour market entry or re-entry by previously non-employed individuals. While the intensive margin contributes positively at all horizons, its role remains secondary relative to participation responses. Taken together, these patterns point to a participation-centred adjustment process following predictable deaths, consistent with an added worker effect operating primarily through labour force entry.

In the medium to longer run, labour force participation among the predictable-death group remains persistently higher, while conditional working hours exhibit additional, though more modest, adjustments. By $\tau = +4$, the combined contributions of both margins generate the largest observed increases in total weekly working hours and labour income, indicating a sustained and cumulative adjustment process rather than a transitory response.

By contrast, labour supply responses following sudden deaths are markedly less stable and substantially delayed. Event-study estimates show no statistically significant changes at conventional levels in labour force participation, weekly working hours, or labour income in the immediate post-bereavement period ($\tau = 0$ to $\tau = +1$). Although the extensive-margin component is positive at all post-event horizons, total weekly hours fluctuate sharply in both magnitude and sign, reflecting offsetting movements between extensive and intensive adjustments. A statistically detectable increase in labour force participation appears only at a single later event-time point ($\tau = +3$), while responses at other horizons remain imprecisely estimated.

The decomposition results further reveal that the relative contributions of the extensive and intensive margins vary considerably over event time for sudden deaths. These fluctuations are driven in part by small or offsetting changes in total weekly hours, which mechanically amplify the implied shares of each margin and preclude a stable adjustment interpretation. As a result, labour supply responses following sudden deaths do not exhibit a coherent or systematic adjustment pathway comparable to that observed for predictable deaths.

From a conventional added worker effect perspective, sudden deaths constitute highly exogenous income shocks for which immediate labour supply responses might be expected. The absence of such short-run adjustments suggests that emotional distress, informational frictions, or institutional constraints may limit the feasibility

5.3. Heterogeneity by Region

5.3.1. Classification of Regional Groups

Despite geographic proximity, European countries exhibit substantial and persistent structural heterogeneity in key institutional characteristics, including pension systems, the generosity of social protection, labour market regulations, and employment opportunities for older workers. These institutional differences imply that even under the same spousal death shock, the translation of post-bereavement economic impacts into labour supply adjustments may vary systematically across countries.

Drawing on the OECD Social Expenditure Database (SOCX) [26], the 2024 Ageing Report by the European Commission [27], and standard labour market institutional indicators—such as employment protection legislation and retirement incentive structures [28]—European countries can be broadly grouped along two key dimensions: the generosity of social protection systems and the flexibility of labour markets. Along these dimensions, countries tend to form relatively stable institutional clusters [27,28].

In particular, Nordic countries combine high income replacement rates with relatively flexible labour market institutions [28]. Western and Central European countries are characterised by generous social security systems alongside strong employment protection regulations [27]. Southern European countries typically exhibit low employment rates among older workers and welfare systems that rely more heavily on family-based support [29]. Eastern European countries, by contrast, tend to have comparatively low levels of social protection and weaker institutional stability, while maintaining relatively flexible labour markets [30].

This classification is consistent with the welfare regime literature that extends the traditional typology to incorporate distinct Southern European regimes, characterised by fragmented social insurance and a strong reliance on family support [29], as well as post-communist Eastern European regimes shaped by transitional institutional legacies [30]. It also aligns with empirical cluster structures documented in comparative studies using institutional indicators compiled by the OECD [28] and the European Commission [27]. On this basis, this paper adopts the four regional groupings commonly used in the SHARE data—Nordic, Western/Central Europe, Southern Europe, and Eastern Europe—for the heterogeneity analysis. The list of countries included in each region and the detailed classification criteria are reported in Appendix Table D1.

5.3.2. Event-Study Estimates by Region

Table 4 and Appendix Table C7 show that the event-time path of labour supply responses following spousal death varies markedly across regions, reflecting heterogeneity in institutional environments and labour market structures. Both the magnitude and the timing of post-bereavement adjustments differ substantially across regions, as does the relative importance of participation and working-hours responses.

In Nordic countries, labour force participation increases significantly from the immediate post-spousal death period onward and remains elevated throughout the event-time horizon. Participation effects are statistically significant at all post-event horizons, rising from 0.109 at $\tau = 0$ to 0.204 at $\tau = +4$. Weekly working hours also increase substantially, with statistically significant responses emerging from $\tau = +1$ and strengthening over time. By contrast, labour income responses are more uneven, with no significant short-run effects but a large and statistically significant increase at $\tau = +4$. Taken together, these patterns point to a sustained labour supply adjustment driven primarily by participation and hours, consistent with a high-employment regime that combines strong labour market attachment with extensive institutional support.

In Western and Central Europe, labour force participation responses are more moderate and concentrated in the early post-bereavement period. Participation effects are statistically significant at $\tau = +1$ and $\tau = +2$, but fade thereafter. In contrast, log weekly working hours exhibit persistent and statistically significant increases across most post-event horizons, while labour income rises gradually and becomes statistically significant only in the longer run. This pattern suggests that labour supply adjustment in this region operates predominantly through the intensive margin rather than sustained participation expansion.

In Southern Europe, changes in labour force participation are generally small and statistically insignificant across event times. By contrast, weekly working hours increase sharply and consistently following spousal death, with statistically significant effects observed at all post-event horizons. Positive labour income responses also emerge, becoming statistically significant at $\tau = +2$ and $\tau = +4$. These findings indicate that adjustment in Southern Europe is concentrated primarily along the intensive margin, reflecting limited scope for labour market entry but substantial flexibility in hours among the employed.

In Eastern Europe, labour supply responses following bereavement are relatively muted. Participation and weekly hours exhibit statistically significant responses only at selected event-time horizons, while no consistent or statistically significant post-bereavement response is detected in annual labour income. This pattern is consistent with adjustment occurring under more constrained labour market and income dynamics, characterised by limited and episodic flexibility in both participation and hours.

Table 4. Regional Event-Study Estimates of Labour Supply Responses to Spousal Death

Region	$\tau = 0$	$\tau = +1$	$\tau = +2$	$\tau = +3$	$\tau = +4$
Panel A: Labour Force Participation Rate					
Nordic (NORD)	0.109*	0.163***	0.149**	0.183***	0.204***
Western/Central (CONT)	0.023	0.076***	0.073***	0.017	0.040
Southern (MED)	0.034	0.034	0.056	0.051	0.078
Eastern (EAST)	0.013	0.038**	0.013	0.033	0.031
Panel B: Log Weekly Working Hours					
Nordic (NORD)	0.300	0.387**	0.405**	0.329	0.528**
Western/Central (CONT)	0.135	0.219***	0.300***	0.185*	0.337**
Southern (MED)	0.248***	0.240**	0.389***	0.355***	0.437***
Eastern (EAST)	0.083	0.151***	0.096	0.182**	0.123
Panel C: Log Annual Labour Income					
Nordic (NORD)	-0.185	0.078	0.440	-0.035	1.463***
Western/Central (CONT)	0.103	0.592**	0.418	0.317	1.000***
Southern (MED)	0.544*	0.360	0.680**	0.552	1.037**
Eastern (EAST)	-0.013	-0.025	0.203	-0.065	0.100

Notes: This table reports event-study difference-in-differences estimates of labour supply responses to spousal death by region. Coefficients correspond to changes relative to $\tau = -1$. Panel A reports labour force participation, Panel B log weekly working hours, and Panel C log annual labour income. All specifications include individual and time fixed effects, with standard errors clustered at the individual level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Taken together, these results highlight that the timing and composition of labour supply adjustment following spousal death vary systematically across regions. The relative importance of extensive-margin responses, working-hours adjustments, and income changes depends critically on the surrounding institutional environment, underscoring the role of regional labour market and social protection structures in shaping post-bereavement labour supply dynamics.

5.3.3. Decomposition into Extensive and Intensive Margins

As established in the preceding analysis, the total labour supply response to spousal death exhibits substantial heterogeneity across regions. Differences in aggregate effects alone, however, do not fully reveal the underlying adjustment mechanisms operating within each institutional environment. This section therefore decomposes the unconditional change in weekly working hours, $\Delta E[H]_\tau$, into changes in labour force participation (the extensive margin, $\Delta p_\tau \cdot h_0$) and changes in weekly working hours conditional on employment (the intensive margin, $p_0 \cdot \Delta h_\tau$), in order to characterise region-specific adjustment pathways.

Table 5 reports the event-study estimates of $\Delta E[H]_\tau$ and its decomposition into extensive and intensive margins by region, aligned by event time relative to spousal death. The table summarises both the total labour supply response and the corresponding margin-specific contributions underlying the aggregate effects.

In Nordic countries, unconditional weekly working hours increase immediately after bereavement and remain elevated throughout the post-event horizon. $\Delta E[H]_\tau$ rises from 4.30 hours at $\tau = 0$ to over 7.39 hours by $\tau = +4$. For most event-time periods, the extensive margin accounts for the majority of the total adjustment, with extensive-margin shares ranging from approximately 0.62 to 0.81. This pattern indicates that labour supply adjustment in Nordic countries is predominantly driven by labour market entry or re-entry, consistent with a participation-centred adjustment pathway.

In Western and Central Europe, total labour supply responses are positive but more volatile across event times. While $\Delta E[H]_\tau$ increases from 2.58 hours at $\tau = 0$ to 4.60 hours at $\tau = +4$, the relative importance of adjustment margins varies substantially over time. At some horizons (e.g., $\tau = +1$ and $\tau = +2$), the extensive margin plays a dominant role, whereas at others (notably $\tau = 0$ and $\tau = +4$), intensive-margin adjustments account for a larger share of the total response. This pattern suggests the absence of a stable or dominant adjustment channel in this region.

In Southern Europe, labour supply adjustment is driven primarily by changes in weekly working hours among those already employed. Although $\Delta E[H]_\tau$ is positive at all post-event horizons, the extensive margin accounts for less than half of the total adjustment throughout most of the event-time window. Instead, intensive-margin contributions are large in absolute terms, especially at $\tau = +2$, where changes in conditional hours account for the majority of the increase in unconditional weekly hours. This pattern indicates that labour supply adjustment in Southern Europe operates predominantly along the intensive margin rather than through labour market entry or re-entry.

For Eastern Europe, total changes in unconditional weekly hours are relatively small in magnitude. While $\Delta E[H]_\tau$ is positive at most horizons, decomposition results should be interpreted with caution. When total changes are close to zero, extensive-margin shares can become mechanically inflated and do not reflect economically meaningful adjustment patterns. In this region, absolute changes in both labour force participation and conditional working hours remain limited, suggesting constrained scope for sustained labour supply adjustment following bereavement.

Table 5. Decomposition of Labour Supply Responses by Region

Event Time (τ)	$\Delta E[H]_\tau$	Extensive $(\Delta p_\tau \cdot h_0)$	Intensive $(p_0 \cdot \Delta h_\tau)$	Extensive Share
Nordic				
$\tau = 0$	4.302	4.605	1.674	0.733
$\tau = +1$	5.322	6.828	2.106	0.764
$\tau = +2$	5.876	6.107	3.814	0.616
$\tau = +3$	4.587	7.602	1.796	0.809
$\tau = +4$	7.395	8.355	4.688	0.641
Western/Central Europe				
$\tau = 0$	2.576	0.782	0.970	0.446
$\tau = +1$	2.620	2.399	0.632	0.792
$\tau = +2$	3.953	2.421	0.770	0.759
$\tau = +3$	2.576	0.189	0.098	0.658
$\tau = +4$	4.603	1.131	2.168	0.343
Southern Europe				
$\tau = 0$	3.724	1.321	2.609	0.336
$\tau = +1$	4.144	1.183	2.885	0.291
$\tau = +2$	5.466	2.081	7.860	0.209
$\tau = +3$	4.609	1.805	2.041	0.469
$\tau = +4$	5.280	3.021	3.391	0.471
Eastern Europe				
$\tau = 0$	1.179	0.672	0.207	0.765
$\tau = +1$	1.659	1.737	-0.280	1.192
$\tau = +2$	1.020	0.699	-0.436	2.661
$\tau = +3$	2.240	1.333	0.559	0.704
$\tau = +4$	1.104	1.244	-1.126	10.579

Notes: This table reports a first-order decomposition of changes in unconditional weekly working hours, $\Delta E[H]_\tau$, into extensive and intensive margin components by region and event time. Event-time coefficients are normalised at $\tau = -1$. When total changes in weekly hours are small, the implied extensive-margin share may exceed one and should not be interpreted as economically meaningful.

Overall, the decomposition reveals pronounced regional differences in labour supply adjustment mechanisms. In Nordic countries, adjustment is rapid and predominantly participation-driven; in Southern Europe, it is concentrated along the intensive margin; and in Western/Central and Eastern Europe, adjustment dynamics are more fragmented and less stable, with no single margin consistently accounting for changes in total labour supply.

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5.3.4. Discussion

The regional analysis reveals substantial heterogeneity in labour supply responses to spousal death that cannot be accounted for by average effects alone. Whether labour supply adjusts following bereavement—and which margins are used to accommodate such adjustment—depends critically on the institutional environment in which individuals reside. In particular, the feasibility and stability of adjustment along the extensive margin (labour force participation) versus the intensive margin (weekly working hours conditional on employment) vary markedly across regions, shaping distinct post-bereavement adjustment profiles.

This structure is most clearly observed in Nordic countries. Event-study estimates indicate that labour force participation increases immediately after spousal death and remains elevated throughout the post-event horizon. Weekly working hours also rise at several event-time points, translating into sizable gains in annual labour income at longer horizons. The decomposition results show that increases in unconditional weekly working hours are predominantly driven by the extensive margin, with extensive-margin shares generally exceeding 60 per cent and often approaching 80 per cent. While the intensive margin contributes positively in absolute terms, it consistently accounts for a smaller fraction of the total adjustment. This pattern is consistent with an institutional environment characterised by high baseline employment, relatively low barriers to labour market re-entry, and flexible work arrangements, which facilitate participation-centred adjustment even in the presence of generous social protection.

In Western and Central Europe, labour supply adjustment operates along both margins but in a less stable and persistent manner. Labour force participation and weekly working hours increase at selected event-time points following bereavement; however, these responses do not consolidate into a smooth or monotonic adjustment path. Decomposition results reveal that the relative contributions of the extensive and intensive margins vary substantially across event times. At some horizons, participation responses dominate, while at others, hours adjustments among the employed account for a larger share of the total change. This pattern suggests that labour supply adjustment in this region is more fragmented, reflecting institutional settings that provide moderate income protection but impose frictions on sustained labour market re-entry and flexible hours adjustment.

Southern Europe exhibits a markedly different adjustment profile. Event-study estimates show that changes in labour force participation are generally small and statistically insignificant throughout the post-bereavement period. Nevertheless, unconditional weekly working hours increase persistently, driven primarily by intensive-margin adjustments. The decomposition indicates that the intensive margin accounts for the majority of the total labour supply response, particularly at medium-term horizons where conditional hours changes dominate the adjustment. This pattern is consistent with institutional environments characterised by strong employment protection, limited availability of part-time or flexible contracts, and restricted pathways for labour market re-entry, which constrain participation responses and shift adjustment towards changes in hours among incumbent workers.

In Eastern Europe, labour supply responses following bereavement are limited in absolute magnitude. Event-study estimates indicate only sporadic changes in labour force participation and weekly working hours, with no consistent post-bereavement response in annual labour income. Decomposition results should be interpreted with caution in this context: when total changes in unconditional weekly hours are small, the implied margin shares can become mechanically large or exceed one, reflecting arithmetic artefacts rather than economically meaningful adjustment patterns. Overall, the evidence suggests that institutional constraints in Eastern Europe limit the scope for sustained labour supply adjustment along either margin.

Taken together, these findings indicate that post-bereavement labour supply responses are shaped less by the size of the spousal death shock itself than by the set of adjustment margins that are institutionally available. In Nordic countries, labour force participation serves as a primary and stable adjustment channel. In Southern Europe, constrained participation shifts adjustment towards the intensive margin. In Western and Central Europe, both margins operate intermittently without forming a persistent adjustment trajectory. In Eastern Europe, effective adjustment appears difficult along either margin. This regional structure of adjustment mechanisms is consistently supported across the event-study estimates and the decomposition analysis, underscoring the central role of institutional context in shaping labour supply responses to bereavement.

6. Robustness Checks

This section presents a series of robustness and diagnostic checks that assess the sensitivity of the baseline results to alternative matching structures, event-time constructions, and normalisation choices.

6.1. Robustness to Alternative Exact-Matching Strata

This subsection evaluates whether the decomposition results depend on how exact-matching strata are defined in the baseline specification. In the main analysis, individuals are matched on the interaction of birth cohort, gender, and country. To examine whether reliance on any single matching dimension drives the results, the analysis is repeated under alternative matching structures that sequentially omit one of these dimensions.

To assess robustness, three alternative strata definitions are considered: birth cohort $\times$ gender, birth cohort $\times$ country, and gender $\times$ country. Aside from these changes to the matching structure, all elements of the estimation strategy remain unchanged, including the cohort-stacked event-study DID design and the normalisation of the pre-event period at $\tau = -1$.

The resulting decomposition estimates, summarised over the post-event window from $\tau = 0$ to $\tau = +4$, are presented in Appendix Table C10. Across all matching schemes, the magnitude of the total change in unconditional weekly working hours and its internal decomposition are identical. In each case, the extensive margin accounts for approximately three quarters of the post-bereavement adjustment, while the contribution of the intensive margin remains modest.

These findings indicate that the participation-centred adjustment mechanism identified in the baseline analysis does not hinge on a particular definition of matching strata. Rather than reflecting artefacts of a specific common support construction, the decomposition pattern is mechanically invariant across alternative and reasonable matching choices, reinforcing the interpretation that post-bereavement labour supply adjustment operates primarily through labour force participation.

6.2. Robustness to Alternative Event-Time Construction

6.3. Robustness to Alternative Event-Time Construction

The baseline analysis measures event time at the annual level, which facilitates interpretation and sample alignment but may mask heterogeneity in exposure length when spousal deaths occur at different points within a calendar year. This subsection therefore examines whether the estimated labour supply responses are sensitive to this temporal aggregation.

Event time is reconstructed using monthly information on interview dates and spousal death dates and grouped into six-month intervals. Pre-death outcomes are measured over the -6 to -1 month window, while post-death responses are summarised over the 0–6, 6–12, 12–24, and 24–30 month intervals. All other aspects of the estimation strategy—including fixed effects, control variables, and clustering—remain identical to the baseline specification.

Estimates based on this alternative timing construction are reported in Appendix Table C11. Across all labour supply measures, the estimated coefficients are small in magnitude and generally statistically insignificant at conventional levels. Importantly, no systematic or pronounced short-run responses emerge immediately following spousal death, and the estimates do not display sharp discontinuities across post-event intervals.

Overall, these results indicate that the absence of strong short-run labour supply responses in the baseline analysis is not an artefact of annual event-time aggregation. Rather, the findings persist when event timing is measured at a finer temporal resolution, reinforcing the conclusion that post-bereavement labour supply adjustment does not exhibit abrupt changes in the immediate aftermath of spousal death.

6.4. Robustness to Alternative Normalisations of Event Time

Event-study estimates are interpreted relative to a chosen pre-event reference period, raising the possibility that observed dynamics could be sensitive to normalisation choices. This subsection therefore assesses whether the estimated labour supply responses depend on the specific reference period used to anchor event-time coefficients.

In addition to the baseline normalisation at $\tau = -1$, two alternative schemes are considered. The first shifts the reference period to $\tau = -2$, while the second normalises coefficients using the average of the two pre-event periods ($\tau = -2$ and $\tau = -1$). These alternative normalisations are obtained through linear transformations of the baseline coefficients, with the estimation sample and control structure held fixed.

Appendix Table C12 reports the resulting event-time profiles under these alternative normalisations. Across all schemes, estimated effects in the immediate post-bereavement period ($\tau = 0$) remain small in magnitude and are not statistically significant. From $\tau = +1$ onwards, point estimates are consistently positive across normalisation choices, although statistical significance varies mechanically with the choice of reference period.

Importantly, while coefficient magnitudes differ by construction across normalisations, the timing and overall shape of the post-event profiles remain stable. In all cases, labour supply responses emerge only after the initial post-bereavement period and evolve smoothly over subsequent event times.

Overall, these results indicate that the dynamic patterns documented in the baseline analysis are not driven by an arbitrary choice of event-time normalisation. Rather, the qualitative timing of post-bereavement labour supply adjustment is robust to reasonable alternative definitions of the pre-event reference period.

6.5. Robustness to Leave-One-Country-Out (LOCO)

Given the cross-national nature of the data, an important concern is whether the estimated labour supply responses are disproportionately influenced by observations from a small number of countries. This subsection addresses this issue using a Leave-One-Country-Out (LOCO) exercise.

The analysis sequentially re-estimates the baseline specification while excluding one country at a time, holding the cohort-stacked event-study structure and control variables fixed. Israel is excluded throughout due to data comparability considerations. For ease of comparison, post-bereavement effects are summarised over the Post 0–1 year and Post 1–3 year windows.

The resulting LOCO averages, reported in Appendix Table C13, closely track the baseline estimates across all outcome variables. Excluding individual countries does not materially alter either the magnitude or the direction of the estimated responses, indicating that the aggregate findings are not driven by any single country.

Overall, the evidence suggests that the observed labour supply adjustments reflect a pattern that is broadly shared across countries in the sample, rather than being dominated by the influence of a small number of national contexts. The evidence therefore supports the interpretation that the observed labour supply adjustments reflect a common cross-national pattern, rather than country-specific institutional peculiarities.

6.6. Placebo Timing Tests

This subsection implements placebo timing tests to assess whether the estimated post-bereavement responses are uniquely associated with the true timing of spousal death. If similar patterns were to arise when event timing is assigned arbitrarily, the causal interpretation of the baseline estimates would be weakened.

The placebo exercise advances the event year by three and four years relative to the actual death date and re-estimates the event-study specification using identical samples, controls, and fixed effects.

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To avoid contamination from the true event, only periods occurring strictly prior to the actual death are retained.

Placebo estimates are reported in Appendix Table C14. Across outcomes and placebo specifications, joint tests fail to reveal systematic pre-trends or persistent post-event responses around the placebo timing. While isolated post-period joint tests approach conventional significance levels in a small number of cases, these patterns do not replicate across placebo shifts or outcomes and exhibit no coherent temporal structure.

The absence of stable and reproducible effects under arbitrary event timing reinforces the interpretation that the baseline estimates capture responses tied to the true occurrence of spousal death rather than to spurious time patterns.

6.7. Robustness to Alternative Control Group Definitions

The baseline analysis constructs the comparison group using both never-treated individuals and those treated at later event times. A potential concern is that individuals approaching spousal death may begin adjusting labour supply in advance, introducing anticipation effects into the comparison group.

As an additional robustness check, an alternative specification restricts the comparison group to not-yet-treated individuals whose spousal death occurs at least three years after the cohort year. This restriction substantially reduces sample overlap, providing a more stringent test of the identifying assumptions at the cost of reduced statistical power.

Results under this specification are summarised in Appendix Table C15. As expected, restricting the comparison group to not-yet-treated individuals substantially reduces sample size and overlap, leading to a noticeable loss of statistical precision—particularly for weekly working hours. Under this more restrictive design, post-bereavement estimates are attenuated and less precisely estimated, while pre-bereavement coefficients continue to show no evidence of differential trends.

This comparison underscores the trade-off inherent in control group construction: tightening the definition of the comparison group reduces potential anticipation bias but comes at the cost of diminished overlap and statistical power. The baseline specification represents a pragmatic balance between these considerations. The robustness exercise therefore supports the interpretation that the main results are not driven by pre-trends or anticipation effects, while also highlighting the importance of sufficient overlap for informative estimation.

7. Conclusion

This paper examines labour supply adjustment following spousal death at older ages using a dynamic event-study framework that explicitly decomposes responses into extensive- and intensive-margin components. By distinguishing between labour force participation and changes in weekly working hours, the analysis shows that, in later-life transitions, the added worker effect operates primarily through labour market entry and re-entry rather than through marginal adjustments in hours among those already employed. By further incorporating heterogeneity by death predictability and institutional environment, the study clarifies when and under what conditions participation-centred adjustment mechanisms become operative for older individuals, thereby sharpening the interpretation of the decomposition results.

The findings indicate that labour supply responses to spousal death among older individuals do not arise instantaneously but instead emerge with a delay of around one year after bereavement and persist over subsequent years. These adjustments are driven predominantly by the extensive margin, reflecting increased labour force participation among individuals who were previously non-employed at older ages. In contrast, changes in weekly working hours among the employed contribute more modestly. As a result, increases in unconditional weekly working hours later in life largely reflect discrete participation decisions rather than continuous adjustments along the intensive margin.

The prominence of participation-centred adjustment is closely linked to the institutional context facing individuals at older ages. At later stages of the life cycle, flexibility in working hours is often limited, and labour supply decisions are tightly connected to retirement rules, pension eligibility, and employment protection regimes. While the results cannot be attributed solely to institutional constraints, the tendency for older individuals to respond to income shocks such as spousal death through changes in labour force participation rather than gradual hour adjustments is consistent with structural features of labour supply in later life. In this sense, the analysis provides evidence that the added worker effect at older ages manifests primarily along the extensive margin.

An additional consideration concerns the potential role of informal caregiving prior to spousal death. In particular, reductions in labour supply before bereavement may partly reflect time devoted to caring for an ill partner, such that the observed post-bereavement increase in labour supply could, in part, capture the release of caregiving constraints rather than a purely income-driven response. While the present analysis does not directly observe caregiving intensity, several features of the empirical results mitigate this concern. First, labour supply adjustments emerge with a substantial delay following bereavement, rather than immediately upon the partner's death, which is less consistent with a mechanical rebound from caregiving cessation. Second, the stronger responses observed following sudden deaths—where prolonged caregiving is unlikely—suggest that caregiving alone cannot account for the main patterns. Nevertheless, caregiving responsibilities are likely to interact with labour supply decisions around the time of spousal death, and future research that explicitly links pre-bereavement caregiving intensity to post-bereavement labour supply adjustment would provide a valuable extension of the present analysis.

These conclusions are robust across a wide range of alternative specifications, including different event-time constructions, normalisation choices, country-level exclusions, placebo timing tests, and alternative comparison group definitions, suggesting that the results are not driven by specific modelling choices or sample composition in older populations.

From a policy perspective, the findings underscore the importance of labour force participation as an adjustment margin to household income shocks at older ages. For individuals experiencing bereavement near the retirement margin, institutional arrangements that facilitate labour market entry or re-entry, as well as access to suitable employment opportunities, may warrant particular attention. More broadly, labour market and social insurance policies targeting older populations may benefit from considering not only income replacement mechanisms but also policies that support continued or renewed attachment to the labour market later in life.

Finally, while the present analysis focuses on labour supply responses at older ages, spousal death may interact with other dimensions of economic behaviour, including savings decisions, health trajectories, and informal caregiving responsibilities. Examining these interactions jointly would help to develop a more comprehensive understanding of economic adjustment processes following bereavement in later life.

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[14,31**?** –36]

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Appendix A. Data Construction and Event-Time Panel Setup

Appendix A.1. Original SHARE Panel Structure in Calendar Time

The SHARE survey records interview dates and spousal death dates for each respondent in calendar time. Under this original panel structure, observations are indexed by interview waves rather than by time relative to spousal death.

Table A1. Illustration of the Original SHARE Calendar-Time Panel Structure

ID	Wave	Interview Year/Month	Spouse ID	Death Indicator	Death Year/Month	Outcome
1	2	200805	9001	0	201006	Y
1	4	201005	9001	0	201006	Y
1	5	201305	9001	1	201006	Y
2	2	200904	9002	0	201106	Y
2	4	201106	9002	1	201106	Y
3	2	200709	9003	0	.	Y
3	4	201105	9003	0	.	Y
3	5	201307	9003	0	.	Y

Notes: Table A1 presents a stylised illustration of the original SHARE panel structure in calendar time, in which observations are indexed by interview waves rather than by time relative to spousal death. Because interview dates and spousal deaths occur at different calendar points across individuals, observations cannot be directly aligned by event time.

Appendix A.2. Construction of Event Time (τ) Relative to Spousal Death

This subsection describes the construction of event time (τ) relative to spousal death. The procedure converts interview dates and spousal death dates recorded in calendar time into a standardised event-time measure suitable for the event–study difference-in-differences design.

Step 1. Calculation of Monthly Event-Time Lags.

For each respondent i, the interview month ($intm$) and the spousal death month ($dthm$) are defined in numeric month units. The monthly event-time lag is calculated as

$$et_m = intm - dthm. \tag{A1}$$

Example. If spousal death occurs in July 2019, the death-month identifier is constructed using the numeric month representation as

$$dthm = 2019 \times 12 + 7. \tag{A2}$$

Step 2. Conversion of Monthly Event-Time Lags to Annual Event Time.

To convert the monthly event-time lag into an annual event-time measure, the analysis applies a floor-based binning rule:

$$\tau = \left\lfloor \frac{et_m}{12} \right\rfloor. \tag{A3}$$

Table A2 provides a numerical illustration of this conversion from monthly event-time lags to annual event time. During this step, an initial trimming rule is applied that restricts τ to lie within a symmetric window around zero.

Step 3. Monthly-Based Precision Correction.

Because some SHARE observations lack complete monthly information, additional correction procedures are applied when monthly event-time lags cannot be precisely calculated.

(a) *Setting a common reference month for the event.* When only the year of spousal death is observed, the analysis assigns the mid-year month (June) of the death year as the reference month for the event.
(b) *Observations with monthly information available.* When monthly interview information is available, the analysis maintains a ±60-month (±5-year) window around the reference month, ensuring that only observations within five years before and after the event are included.

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(c) *Observations without monthly information.* When monthly information is unavailable, the annual event-time lag is used as a fallback measure.

Step 4. Event-Time Trimming.

In the final step, event time τ is constrained to fall within a predefined range:

$$\tau \in [-4, +4]. \quad \text{(A4)}$$

This range is chosen to accommodate the biennial interview structure of the SHARE survey, which generates gaps in observed interview timing.

Step 5. Vertical Stacking of Cohort-Level Event-Time Panels.

Cohorts are defined based on the year of spousal death. Event-time panels constructed for each cohort are then vertically combined to form a stacked multi-cohort event-time panel. This stacking procedure enables comparisons across cohorts along a common event-time axis and mitigates timing-related bias associated with two-way fixed effects estimators.

Table A2. Example of the Stacked Event-Time Panel

ID	Cohort	Spouse ID	Death Year/Month	Event Time (τ)	Interview Date	Outcome
1	2010	9001	201006	-2	200806	Y
1	2010	9001	201006	-1	200906	Y
1	2010	9001	201006	0	201006	Y
1	2010	9001	201006	+1	201107	Y
2	2011	9103	201106	-2	200904	Y
2	2011	9103	201106	-1	201005	Y
2	2011	9103	201106	0	201106	Y
2	2011	9103	201106	+1	201206	Y
3	.	.	.	-3	200709	Y
3	.	.	.	-1	201005	Y
3	.	.	.	0	201105	Y

Notes: Observations are reorganised from calendar time into event time ($\tau \in [-4, +4]$), measured in years relative to spousal death.

Appendix A.3. Distribution of Treated and Control Group Observations by Event Time (τ)

This section reports the distribution of treated and control observations across event time in the stacked multi-cohort event-time panel.

Table A3. Distribution of Treated and Control Observations by Event Time (τ)

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	143663	331	143994
-3	156007	408	156415
-2	173821	553	174374
-1	181101	410	181511
0	213213	980	214193
$+1$	197991	780	198771
$+2$	193393	528	193921
$+3$	188266	354	188620
$+4$	173281	223	173504
Total	1620736	4567	1625303

Notes: This table reports the number of treated and control observations (rows) in the stacked multi-cohort event-time panel for $\tau \in [-4, +4]$. The treated group consists of individuals whose spouse died during the observation period, while the control group comprises not-yet-treated individuals observed in the same cohort year until their own spousal death occurs. Counts refer to person-period observations rather than unique individuals.

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Table A4. Treated and Control Counts by Event Time (τ): True Acute Deaths

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	54	7	61
-3	43	6	49
-2	29	5	34
-1	16	3	19
0	69	17	86
$+1$	41	14	55
$+2$	24	12	36
$+3$	12	11	23
$+4$	2	6	8
Total	290	81	371

Notes: This table reports the number of treated and control observations (rows) in the stacked event-time panel for $\tau \in [-4, +4]$, restricted to cases classified as true acute deaths. The treated group consists of individuals whose spouse died during the observation period, while the control group comprises not-yet-treated individuals observed in the same cohort year until their own spousal death occurs. Counts refer to person-period observations rather than unique individuals, reflecting the stacked multi-cohort event-time structure.

Table A5. Treated and Control Observation Counts by Event Time (τ): Scandinavian Region

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	18137	30	18167
-3	19840	42	19882
-2	21553	51	21604
-1	21868	35	21903
0	25183	91	25274
$+1$	22224	83	22307
$+2$	22088	50	22138
$+3$	21119	35	21154
$+4$	18930	26	18956
Total	190942	443	191385

Notes: This table reports the number of treated and control observations (rows) in the stacked event-time panel for $\tau \in [-4, +4]$ for the Scandinavian Region. Counts refer to person-period observations rather than unique individuals.

Table A6. Treated and Control Observation Counts by Event Time (τ): Western and Central Europe Region

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	60492	102	60594
-3	64965	118	65083
-2	69787	173	69960
-1	72164	130	72294
0	81372	281	81653
$+1$	74515	233	74748
$+2$	71197	145	71342
$+3$	68439	95	68534
$+4$	62558	52	62610
Total	625489	1329	626818

Notes: This table reports the number of treated and control observations (rows) in the stacked event-time panel for $\tau \in [-4, +4]$ for the Western and Central Europe Region. Counts refer to person-period observations rather than unique individuals.

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Table A7. Treated and Control Observation Counts by Event Time (τ): Southern Europe Region

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	30545	71	30616
-3	32396	70	32466
-2	35441	102	35543
-1	36653	72	36725
0	42187	174	42361
$+1$	37549	133	37682
$+2$	36893	79	36972
$+3$	36530	72	36602
$+4$	31906	41	31947
Total	320100	814	320914

Notes: This table reports the number of treated and control observations (rows) in the stacked event-time panel for $\tau \in [-4, +4]$ for the Southern Europe Region. Counts refer to person-period observations rather than unique individuals.

Table A8. Treated and Control Observation Counts by Event Time (τ): Eastern Europe Region

Event Time (τ)	Control Group (N)	Treated Group (N)	Total (N)
-4	34489	128	34617
-3	38806	178	38984
-2	47040	227	47267
-1	50416	173	50589
0	64471	434	64905
$+1$	63703	331	64034
$+2$	63215	254	63469
$+3$	62178	152	62330
$+4$	59887	104	59991
Total	484205	1981	486186

Notes: This table reports the number of treated and control observations (rows) in the stacked event-time panel for $\tau \in [-4, +4]$ for the Eastern Europe Region. Counts refer to person-period observations rather than unique individuals.

Appendix A.4. Distribution of Household Size in the Asset Sample

Table A9. Distribution of Household Size in the Asset Sample

Household size	Wave 1	Wave 2	Wave 4	Wave 5	Wave 6	Wave 8	Wave 9
1 member	54.4	52.9	54.2	53.7	53.4	57.0	56.3
2 members	45.1	46.8	45.8	46.3	46.6	43.0	43.7
3 members	0.5	0.3	0.1	0.1	0.0	0.0	0.0
4+ members	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Observations	20,796	25,178	39,722	45,107	46,397	37,553	48,315

Notes: This table reports the distribution of household size in the asset sample by SHARE wave. Entries show percentages within each wave and sum to 100. The number of households observed in each wave is reported in the final row. Households with more than three members account for a negligible share of the sample in all waves.

Appendix A.5. Distribution of the Number of Children (Top-Coding Diagnostics)

Table A10. Distribution of the Number of Children and Top-Coding Thresholds

Measure	Wave 1	Wave 2	Wave 4	Wave 5	Wave 6	Wave 8
Adult children > 10	0.13	0.09	0.02	0.05	0.04	0.04
Minor children > 6	0.80	0.58	0.31	0.38	0.31	0.30
Total children > 10	2.46	2.11	1.47	1.57	1.37	1.29
Observations	30,416	37,132	57,982	66,038	68,055	53,695

Notes: This table reports the share of observations exceeding the specified top-coding thresholds for child-related variables, by SHARE wave. Entries show percentages within each wave. The number of observations in each wave is reported in the final row.

Appendix A.6. Variable Construction and Data Cleaning

This appendix documents the construction of the key variables used in the main analysis, together with the associated data cleaning and transformation procedures. While the main text describes the variables at a conceptual level, this appendix reports the corresponding SHARE variable names in parentheses where relevant, in order to ensure reproducibility.

The analysis uses wave-specific modules from SHARE Release 9.0, merged at the individual level using the unique respondent identifier (`mergeid`). Non-response codes such as "Don't know" and "Refused" are treated as missing values, in accordance with the coding conventions of each SHARE module.

Appendix A.6.1. Outcome Variables

The analysis employs three labour supply outcomes designed to capture different margins of labour supply adjustment following spousal death.

Labour Force Participation.

Labour force participation is defined as a binary indicator equal to one if an individual is either employed or unemployed, and zero otherwise (`lfp_s`). The measure is constructed by combining SHARE employment status and unemployment-related questions. Retired individuals and other economically inactive respondents are classified as non-participants. When employment status cannot be clearly identified, the observation is treated as missing. In cases where derived employment statuses can be conservatively classified as non-working, the value is recoded to zero and a flag indicating this replacement is generated.

Log Weekly Working Hours.

Weekly working hours are based on reported typical weekly hours worked (`lnwhour`). To mitigate the influence of outliers, reported hours are top-coded at the 99th percentile, and hours for non-workers are set to zero for standardisation. The variable is transformed as $\ln(\text{hours} + 1)$.

Log Annual Labour Income.

Annual labour income is constructed by aggregating labour income components at the annual level and converting them to euros using available exchange-rate information (`ln_earn_eur`). Non-response codes and negative values are treated as missing. When exchange-rate information is unavailable, positive income values are also set to missing in order to avoid unit inconsistencies. To limit the influence of extreme values, income is top-coded at the country-specific 99th percentile; for small cells, regional or full-sample thresholds are applied. The resulting variable is transformed using the natural logarithm.

Appendix A.6.2. Baseline Control Variables

Baseline controls are selected to capture observable individual- and household-level characteristics that are plausibly related to labour supply decisions.

Demographic Characteristics.

Demographic controls include gender (male indicator), age, and age squared (`male`, `age`, `age2`). Age is measured at the interview date, and implausible values are treated as missing.

Household Composition.

Household structure is captured using the number of adult children aged 18 or older and the number of minor children under age 18 (`child18p_cap10`, `minor_n`). Children's ages are computed from reported birth years and interview dates. To reduce the influence of extreme reports, mild top-coding is applied.

Pensions and Insurance Income.

To account for institutional and financial resources that may cushion income losses following spousal death, the analysis includes variables capturing survivors' pensions, old-age and retirement pensions, other public transfers, and private insurance and pension income (`lnsurpen`, `lnoldpen`, `lnotherpen2`, `lnlifeins`). All monetary variables are converted to euros. Non-receipt is coded as zero prior to cleaning non-response codes and negative values, and variables are transformed using logarithmic or inverse hyperbolic sine transformations, as appropriate.

Appendix A.6.3. Variables Excluded from Baseline Controls

Household income, household assets, and health status variables are constructed and cleaned separately but excluded from the baseline regression specification. These variables are likely to respond endogenously to spousal death and may therefore absorb part of the post-bereavement adjustment process itself. To avoid the "bad control" problem, they are included only in selected robustness analyses.

Appendix A.6.4. Event-Time Panel Construction (Summary)

The timing of spousal death is identified using year and month information from the SHARE Exit Interview (XT) module. Event time is defined as the relative year with respect to the date of death, with the year immediately preceding death ($\tau = -1$) serving as the reference period in the event-study difference-in-differences specification. The analysis is conducted within a restricted event-time window to ensure adequate sample support.

Table A11. Key Variables Used in the Analysis

Concept	Variable (in parentheses)	Module
Labour force participation	`lfp_s`	EP
Log weekly working hours	`lnwhour`	EP
Log annual labour income (EUR)	`ln_earn_eur`	EP
Gender (male indicator)	`male`	CV
Age and age squared	`age`, `age*age`	CV
Number of adult children (aged 18+)	`child18p_cap10`	CH
Number of minor children (aged <18)	`minor_n`	CH
Survivors' pensions	`lnsurpen`	EP
Old-age and retirement pensions	`lnoldpen`	EP
Other public transfers	`lnotherpen2`	EP
Private insurance and pension income	`lnlifeins`	EP

Notes: Variable names correspond to those used in the replication code and refer to the original SHARE module definitions.

Appendix A.6.5. Common Cleaning Rules

The following data cleaning rules are applied consistently across all SHARE modules:

(i) Non-response categories (e.g. "Don't know" and "Refused") are coded as missing.
(ii) Monetary variables reported in local currencies are converted to euros using available exchange rate information; observations with missing or unreliable rates are excluded.
(iii) Monetary variables are top-coded at the 99th percentile and transformed using logarithmic or inverse hyperbolic sine functions, as appropriate.
(iv) Reported working hours are top-coded to limit the influence of implausibly large values.

Appendix B. Baseline Characteristics of Treated and Control Groups at $\tau = -1$

Appendix B.1. Summary Statistics for Treated and Control Groups

Table B.1. Demographic and Household Characteristics at $\tau = -1$: Treated vs. Control

Variable	Treated	Control
Male	0.202	0.453
	(0.402)	(0.498)
Age	65.700	64.705
	(5.260)	(5.832)
Region (4-category index)	2.934	2.638
	(1.039)	(1.014)
Number of adult children	1.427	1.390
	(1.494)	(1.454)
Number of minor children	0.844	0.803
	(1.125)	(1.088)

Notes: This table reports sample means of demographic and household characteristics measured at event time $\tau = -1$, the period immediately preceding spousal death. Standard deviations are reported in parentheses. The treated group consists of surviving spouses observed at $\tau = -1$, while the control group comprises not-yet-treated individuals observed in the same cohort year. All variables are measured in the stacked event-time panel. Differences between treated and control groups reflect pre-existing demographic heterogeneity rather than causal effects.

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Table B.2. Economic and Financial Characteristics at $\tau = -1$: Treated vs. Control

Variable	Treated	Control
Log household income	6.209	6.716
	(1.931)	(1.882)
Log household net wealth	4.671	6.047
	(3.994)	(3.903)

Notes: Entries report sample means, with standard deviations in parentheses. Household income and net wealth are expressed in logarithms. Statistics are reported for event time $\tau = -1$. Differences between treated and control groups reflect pre-existing economic heterogeneity rather than causal effects.

Table B.3. Labour Market Characteristics at $\tau = -1$: Treated vs. Control

Variable	Treated	Control
Labour force participation rate	0.149	0.259
	(0.356)	(0.438)
Employment rate	0.137	0.230
	(0.344)	(0.421)
Public sector worker share	0.093	0.134
	(0.291)	(0.340)
Private sector worker share	0.024	0.060
	(0.155)	(0.238)
Self-employed share	0.020	0.036
	(0.139)	(0.187)
Retired share	0.658	0.590
	(0.475)	(0.492)
Unemployed share	0.012	0.029
	(0.110)	(0.169)
Other labour status share	0.169	0.131
	(0.375)	(0.337)
Weekly hours (all individuals)	5.445	9.753
	(13.370)	(17.437)
Log annual labour income (all individuals)	7.373	7.595
	(2.860)	(3.388)
Weekly hours (workers only)	34.750	37.807
	(11.172)	(12.203)
Log annual labour income (workers only)	7.373	7.595
	(2.860)	(3.388)

Notes: This table reports sample means of labour market characteristics measured at event time $\tau = -1$, with standard deviations in parentheses. Labour income variables are expressed in natural logarithms. Weekly working hours and labour income are reported for all individuals and, separately, conditional on employment. Differences between treated and control groups reflect pre-existing labour market heterogeneity rather than causal effects.

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Appendix C. Additional Results and Robustness Checks

Appendix C.1. Mean Labour Supply Outcomes by Event Time

Table C.1. Mean Labour Supply Outcomes by Event Time

Event time (τ)	Control (raw mean)	Treated (raw mean)	Control (counterfactual)
Panel A. Labour Force Participation			
-4	0.261	0.175	0.172
-3	0.260	0.196	0.171
-2	0.260	0.172	0.172
-1	0.259	0.149	0.171
0	0.260	0.113	0.171
1	0.262	0.136	0.173
2	0.263	0.102	0.174
3	0.264	0.085	0.176
4	0.266	0.108	0.177
Panel B. Log Weekly Working Hours			
-4	0.947	0.550	0.662
-3	0.954	0.768	0.670
-2	0.963	0.679	0.679
-1	0.960	0.559	0.675
0	0.970	0.479	0.685
1	0.977	0.525	0.692
2	0.984	0.416	0.699
3	0.989	0.393	0.704
4	0.998	0.462	0.713

Notes: This table reports mean labour supply outcomes for treated and control groups by event time. The treated group consists of individuals whose spouse dies in year $\tau = 0$. The control (raw mean) series reports unadjusted means for the comparison group. The control (counterfactual) series rescales control-group means to match the treated-group level at $\tau = -2$. All outcomes are unconditional group means; no covariates or fixed effects are included.

Table C.1. Mean Labour Supply Outcomes by Event Time (continued)

Event time (τ)	Control (raw mean)	Treated (raw mean)	Control (counterfactual)
Panel C. Log Annual Labour Income			
-4	2.419	1.466	1.557
-3	2.451	1.832	1.589
-2	2.451	1.589	1.589
-1	2.453	1.518	1.591
0	2.462	1.260	1.600
1	2.488	1.320	1.626
2	2.507	1.056	1.645
3	2.521	1.056	1.659
4	2.574	1.349	1.712

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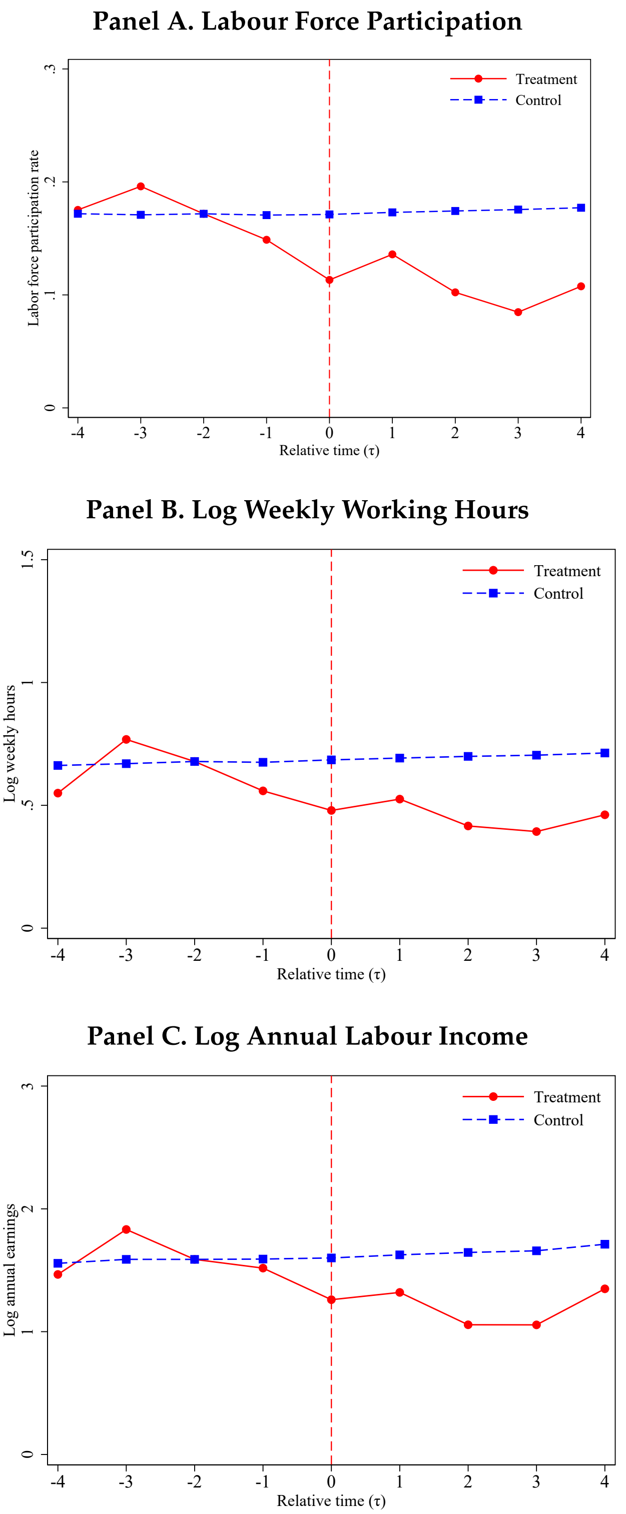

Notes: This figure plots pre-event trends in labour supply outcomes for treated and control groups using unconditional group means by event time relative to spousal death. Event time $\tau = 0$ denotes the year of spousal death. The figure shows no evidence of differential pre-trends between treated and control groups prior to the event.

Figure C.1. Pre-Trends in Labour Supply around Spousal Death

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Table C.2. Full Event-Study Estimates: Main Sample

Event time (τ)	Panel A. Labour Force Participation Rate	Panel B. Log Weekly Hours	Panel C. Log Annual Labour Income
−4	−0.013	−0.089	−0.302*
	(0.020)	(0.065)	(0.180)
−3	0.023	0.108*	0.005
	(0.019)	(0.063)	(0.156)
−2	0.029*	0.155***	0.032
	(0.017)	(0.059)	(0.158)
0	0.030*	0.161***	0.155
	(0.016)	(0.051)	(0.139)
+1	0.063***	0.231***	0.323**
	(0.013)	(0.042)	(0.127)
+2	0.052***	0.253***	0.492***
	(0.016)	(0.053)	(0.135)
+3	0.046***	0.235***	0.269
	(0.017)	(0.057)	(0.168)
+4	0.061***	0.285***	0.825***
	(0.022)	(0.074)	(0.168)
Within R^2	0.259	0.171	0.116
Observations	1,625,303	1,625,303	1,625,303
Individuals	1,030,201	1,030,201	1,030,201
Pre-event joint p-value	0.085	0.001	0.204

Notes: Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and time fixed effects. Control variables include gender, age (and age squared), the number of adult and minor children, and detailed controls for public and private pension income. Event-time coefficients are normalised to the period immediately preceding spousal death ($\tau = -1$). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix C.2. Decomposition of Labour Supply Responses

Appendix C.2.1. Derivation and Construction of Decomposition Components

We begin with the accounting identity for unconditional weekly working hours:

$$H_\tau = p_\tau \cdot h_\tau,$$

where p_τ denotes the labour force participation rate at event time τ, and h_τ denotes average weekly working hours among employed individuals. Let $\tau = 0$ denote the baseline period.

The change in unconditional weekly hours relative to the baseline is given by:

$$\Delta E[H]_\tau = H_\tau - H_0 = p_\tau h_\tau - p_0 h_0.$$

By adding and subtracting appropriate terms, this expression can be rewritten as:

$$\Delta E[H]_\tau = (p_\tau - p_0)h_0 + p_0(h_\tau - h_0) + (p_\tau - p_0)(h_\tau - h_0).$$

The first term corresponds to the *extensive margin*, the second term to the *intensive margin*, and the third term to an interaction component. In the empirical analysis, we adopt a standard first-order approximation that omits the interaction term, which is second order in changes:

$$\Delta E[H]_\tau \approx (p_\tau - p_0)h_0 + p_0(h_\tau - h_0),$$

where p_0 and h_0 denote baseline values measured at $\tau = -1$.

Because p_τ and h_τ are obtained from separate event-study regressions and the interaction term is omitted, the sum of the extensive and intensive components need not equal the total change in unconditional weekly hours exactly in finite samples. Accordingly, the decomposition is interpreted primarily in terms of the timing and relative importance of adjustment channels rather than exact accounting equality.

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Table C.3. Construction of Decomposition Components

Component	Description	Source
Δp_τ	Change in labour force participation after spousal death	Event study (full sample)
Δh_τ	Change in weekly working hours (employed only)	Event study (employed subsample)
p_0	Baseline labour force participation rate	Baseline ($\tau = -1$, full sample)
h_0	Baseline weekly working hours (employed only)	Baseline ($\tau = -1$, employed)

Appendix C.2.2. Decomposition Results

Table C.4. Decomposition of Labour Supply Responses after Spousal Death

Event Time (τ)	$\Delta E[H]_\tau$	Δp_τ	Δh_τ	Extensive Margin ($\Delta p_\tau \cdot h_0$)	Intensive Margin ($p_0 \cdot \Delta h_\tau$)
-4	-0.943	-0.013	-0.447	-0.501	-0.116
-3	1.140	0.023	0.741	0.883	0.192
-2	1.686	0.029	1.690	1.094	0.438
0	2.215	0.030	2.444	1.125	0.634
1	2.746	0.063	2.697	2.385	0.699
2	3.017	0.052	3.392	1.958	0.880
3	3.039	0.046	3.585	1.745	0.930
4	3.413	0.061	3.333	2.289	0.864

Notes: $\Delta E[H]_\tau$ denotes the difference-in-differences change in unconditional weekly working hours relative to $\tau = -1$. Δp_τ and Δh_τ denote changes in labour force participation and conditional weekly working hours, respectively. The extensive and intensive margin components are computed as $(\Delta p_\tau \cdot h_0)$ and $(p_0 \cdot \Delta h_\tau)$. All specifications include individual and wave fixed effects, with standard errors clustered at the individual level.

Appendix C.3. Full Event-Study DID Estimates by Death Type

Panel A. Labour Force Participation Rate

Table C.5. Full Event-Study DID Estimates by Death Type

Event Time (τ)	Predicted	Sudden
-4	-0.018 (0.020)	0.029 (0.057)
-3	0.025 (0.019)	0.037 (0.049)
-2	0.027 (0.017)	0.019 (0.061)
0	0.024 (0.016)	0.049 (0.059)
+1	0.059*** (0.013)	0.032 (0.027)
+2	0.045*** (0.016)	0.032 (0.055)
+3	0.051*** (0.017)	0.104* (0.057)
+4	0.054** (0.022)	0.138 (0.101)
Within R^2	0.261	0.261
Observations	1,625,303	1,625,303
Number of individuals	1,030,201	1,030,201
Joint significance test (p)	0.066	0.880

Panel B. Log Weekly Hours

Table C.6. Full Event-Study DID Estimates by Death Type (continued)

Event Time (τ)	Predicted	Sudden
-4	-0.093 (0.065)	-0.024 (0.180)
-3	0.110* (0.064)	0.426 (0.410)
-2	0.156*** (0.060)	-0.046 (0.236)
0	0.141*** (0.051)	0.121 (0.223)
+1	0.216*** (0.042)	-0.070 (0.071)
+2	0.230*** (0.054)	-0.012 (0.198)
+3	0.243*** (0.056)	0.301 (0.240)
+4	0.287*** (0.074)	0.319 (0.444)
Within R^2	0.174	0.174
Observations	1,625,303	1,625,303
Number of individuals	1,030,201	1,030,201
Joint significance test (p)	0.001	0.758

Panel C. Log Annual Labour Income

Table C.7. Full Event-Study DID Estimates by Death Type (continued)

Event Time (τ)	Predicted	Sudden
-4	-0.302* (0.179)	-0.200 (0.413)
-3	0.038 (0.156)	0.509 (0.585)
-2	0.026 (0.158)	-0.380 (0.569)
0	0.130 (0.139)	-0.033 (0.503)
+1	0.304** (0.128)	-0.015 (0.174)
+2	0.450*** (0.136)	-0.247 (0.488)
+3	0.304* (0.167)	0.507 (0.409)
+4	0.826*** (0.169)	0.286 (0.875)
Within R^2	0.119	0.119
Observations	1,625,303	1,625,303
Number of individuals	1,030,201	1,030,201
Joint significance test (p)	0.191	0.700

Notes: Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and wave fixed effects. Control variables include gender, age (and age squared), the number of adult and minor children, log survivors' pension benefits, log old-age pension benefits, log other public pension income, and log private pension and insurance income. Death type (predicted vs. sudden) is defined using pre-event health trajectories and cause-of-death indicators. Event-time coefficients are normalised at $\tau = -1$. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendix C.4. Decomposition of Labour Supply Responses by Death Type

Table C.8. Decomposition of Labour Supply Responses after Spousal Death, by Death Type

Event Time (τ)	$\Delta E[H]_\tau$	Δp_τ	Δh_τ	Extensive Margin ($\Delta p_\tau \cdot h_0$)	Intensive Margin ($p_0 \cdot \Delta h_\tau$)
Panel A. Predicted Deaths					
-4	-0.982	-0.018	-0.566	-0.673	-0.147
-3	1.165	0.024	0.987	0.893	0.256
-2	1.671	0.026	1.372	1.000	0.356
0	2.155	0.027	1.829	1.013	0.474
1	2.791	0.061	2.673	2.323	0.693
2	3.006	0.048	3.635	1.816	0.943
3	3.153	0.051	3.336	1.938	0.865
4	3.470	0.055	3.283	2.071	0.851
Panel B. Sudden Deaths					
-4	-1.546	0.032	2.907	1.193	0.754
-3	4.702	0.039	2.907	1.485	0.754
-2	-2.012	0.024	2.907	0.923	0.754
0	0.051	0.053	2.907	2.022	0.754
1	-1.449	0.032	3.508	1.223	0.910
2	-1.305	0.038	5.882	1.451	1.525
3	2.295	0.105	3.336	3.975	0.865
4	-3.691	0.130	3.283	4.906	0.851

Notes: This table reports a first-order decomposition of changes in unconditional weekly working hours, $\Delta E[H]_\tau$, into extensive and intensive margin components by death type and event time. Event-time coefficients are normalised at $\tau = -1$. For sudden deaths, component values may appear large relative to total changes in weekly hours when $\Delta E[H]_\tau$ is close to zero, and should therefore be interpreted with caution.

Appendix C.5. Full Event-Study DID Estimates by Region

Panel A. Labour Force Participation Rate

Table C.9. Full Event-Study DID Estimates by Region

Event Time (τ)	Nordic	Western/Central	Southern	Eastern
-4	0.174**	0.000	-0.016	-0.048
	(0.079)	(0.038)	(0.035)	(0.030)
-3	0.092	0.017	-0.018	0.042
	(0.080)	(0.030)	(0.035)	(0.030)
-2	0.081	0.029	0.036	0.024
	(0.064)	(0.031)	(0.037)	(0.027)
0	0.109*	0.023	0.034	0.013
	(0.059)	(0.029)	(0.033)	(0.024)
+1	0.163***	0.076***	0.034	0.038**
	(0.052)	(0.023)	(0.033)	(0.017)
+2	0.149**	0.073***	0.056	0.013
	(0.060)	(0.028)	(0.039)	(0.023)
+3	0.183***	0.017	0.051	0.033
	(0.068)	(0.037)	(0.034)	(0.024)
+4	0.204***	0.040	0.078	0.031
	(0.067)	(0.045)	(0.049)	(0.032)
Within R^2	0.264	0.264	0.264	0.264
Observations	1,625,303	1,625,303	1,625,303	1,625,303
Individuals	1,030,201	1,030,201	1,030,201	1,030,201
Pre-event joint test (p)	0.175	0.772	0.420	0.018

Panel B. Log Weekly Working Hours

Table C.9. Full Event-Study DID Estimates by Region (continued)

Event Time (τ)	Nordic	Western/Central	Southern	Eastern
-4	0.149	-0.108	0.077	-0.150
	(0.229)	(0.125)	(0.127)	(0.102)
-3	0.379	0.083	0.032	0.121
	(0.247)	(0.119)	(0.103)	(0.097)
-2	0.258	0.090	0.221*	0.184**
	(0.214)	(0.113)	(0.121)	(0.088)
0	0.300	0.135	0.248***	0.083
	(0.187)	(0.099)	(0.096)	(0.078)
+1	0.387**	0.219***	0.240**	0.151***
	(0.170)	(0.074)	(0.105)	(0.058)
+2	0.405**	0.300***	0.389***	0.096
	(0.196)	(0.100)	(0.095)	(0.080)
+3	0.329	0.185*	0.355***	0.182**
	(0.233)	(0.108)	(0.129)	(0.078)
+4	0.528**	0.337**	0.437***	0.123
	(0.236)	(0.140)	(0.117)	(0.117)
Within R^2	0.178	0.178	0.178	0.178
Observations	1,625,303	1,625,303	1,625,303	1,625,303
Individuals	1,030,201	1,030,201	1,030,201	1,030,201
Pre-event joint test (p)	0.447	0.374	0.293	0.014

Panel C. Log Annual Labour Income

Table C.9. Full Event-Study DID Estimates by Region (continued)

Event Time (τ)	Nordic	Western/Central	Southern	Eastern
-4	-0.709	-0.229	0.385	-0.310
	(0.666)	(0.365)	(0.445)	(0.222)
-3	-0.263	0.144	0.199	0.104
	(0.520)	(0.343)	(0.349)	(0.191)
-2	-0.787	-0.058	0.507	0.113
	(0.497)	(0.328)	(0.329)	(0.225)
0	-0.185	0.103	0.544*	-0.013
	(0.431)	(0.316)	(0.298)	(0.176)
+1	0.078	0.592**	0.360	-0.025
	(0.417)	(0.267)	(0.304)	(0.164)
+2	0.440	0.418	0.680**	0.203
	(0.470)	(0.303)	(0.310)	(0.172)
+3	-0.035	0.317	0.552	-0.065
	(0.501)	(0.396)	(0.406)	(0.189)
+4	1.463***	1.000***	1.037**	0.100
	(0.560)	(0.371)	(0.432)	(0.201)
Within R^2	0.126	0.126	0.126	0.126
Observations	1,625,303	1,625,303	1,625,303	1,625,303
Individuals	1,030,201	1,030,201	1,030,201	1,030,201
Pre-event joint test (p)	0.442	0.799	0.497	0.248

Notes: Standard errors clustered at the individual level are reported in parentheses. All specifications include individual and wave fixed effects. Control variables include gender, age (and age squared), the number of adult and minor children, log survivors' pension benefits, log old-age pension benefits, log other public pension income, and log private pension and insurance income. Event-time coefficients are normalised at $\tau = -1$. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

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Appendix C.6. Decomposition of Labour Supply Responses by Region

Table C.10. Decomposition of Labour Supply Responses after Spousal Death, by Region

Event Time (τ)	$\Delta E[H]$	Δp_τ	Δh_τ	Extensive Margin ($\Delta p_\tau \cdot h_0$)	Intensive Margin ($p_0 \cdot \Delta h_\tau$)
Panel A. Nordic					
-4	2.209	0.184	3.368	6.925	1.314
-3	3.037	0.102	0.186	3.853	0.073
-2	3.187	0.085	8.131	3.220	3.172
0	4.302	0.122	4.292	4.605	1.674
1	5.322	0.181	5.400	6.828	2.106
2	5.876	0.162	9.777	6.107	3.814
3	4.587	0.202	4.604	7.602	1.796
4	7.395	0.222	12.019	8.355	4.688
Panel B. Western/Central Europe					
-4	-0.830	0.000	3.190	0.004	0.827
-3	1.331	0.015	1.702	0.531	0.441
-2	1.198	0.028	2.643	1.021	0.685
0	2.576	0.022	3.743	0.782	0.970
1	2.620	0.066	2.437	2.399	0.632
2	3.953	0.067	2.973	2.421	0.770
3	2.576	0.005	0.379	0.189	0.098
4	4.603	0.031	8.367	1.131	2.168

Table C.10. Decomposition of Labour Supply Responses after Spousal Death, by Region (continued)

Event Time (τ)	$\Delta E[H]$	Δp_τ	Δh_τ	Extensive Margin ($\Delta p_\tau \cdot h_0$)	Intensive Margin ($p_0 \cdot \Delta h_\tau$)
Panel C. Southern Europe					
-4	1.271	-0.024	0.000	-0.938	0.000
-3	0.492	-0.025	13.817	-0.971	3.010
-2	3.416	0.034	11.505	1.340	2.506
0	3.724	0.033	11.974	1.321	2.609
1	4.144	0.030	13.243	1.183	2.885
2	5.466	0.053	36.081	2.081	7.860
3	4.609	0.046	9.367	1.805	2.041
4	5.280	0.077	15.566	3.021	3.391
Panel D. Eastern Europe					
-4	-2.038	-0.049	-3.306	-1.952	-0.771
-3	1.127	0.042	-1.726	1.670	-0.402
-2	1.538	0.023	-0.959	0.895	-0.224
0	1.179	0.017	0.887	0.672	0.207
1	1.659	0.044	-1.201	1.737	-0.280
2	1.020	0.018	-1.872	0.699	-0.436
3	2.240	0.034	2.399	1.333	0.559
4	1.104	0.031	-4.833	1.244	-1.126

Notes: $\Delta E[H]_\tau$ denotes the DID change in unconditional weekly hours relative to $\tau = -1$. The extensive and intensive components are computed as $(\Delta p_\tau \cdot h_0)$ and $(p_0 \cdot \Delta h_\tau)$, respectively. When total changes in weekly hours are close to zero, relative contributions are not economically meaningful.

Appendix C.7. Common Support and Sample Composition

Table C.11. Sample Sizes under Alternative Common-Support Definitions

Matching strata	Total obs.	Treated obs.	Control obs.
Birth cohort × Gender × Country (BGC)	1,708,852	4,727	1,704,125
Birth cohort × Gender (BG)	1,708,852	4,727	1,704,125
Birth cohort × Country (BC)	1,708,850	4,727	1,704,123
Gender × Country (GC)	1,708,846	4,727	1,704,119

Notes: This table reports the number of treated and control observations in the cohort-stacked event-study sample under alternative exact-matching (common-support) definitions. Treated observations correspond to individuals experiencing spousal death in the cohort year. Control observations include individuals who are never treated or not yet treated. Sample sizes remain virtually unchanged across matching specifications, indicating strong common support between treated and control groups.

Table C.12. Robustness to Alternative Exact-Matching Strata

Decomposition of Total Weekly Working Hours (Post-event average, $\tau = 0$ to $+4$)				
Matching strata	$\Delta E[H]$	Extensive Margin $(\Delta p \cdot h_0)$	Intensive Margin $(p_0 \cdot \Delta h)$	Share of Extensive Margin
Baseline (BGC)	2.683	1.777	0.550	0.760
Birth cohort × Gender (BG)	2.683	1.777	0.550	0.760
Birth cohort × Country (BC)	2.683	1.777	0.550	0.760
Gender × Country (GC)	2.683	1.777	0.550	0.760

Notes: This table reports robustness checks for the decomposition of post-event changes in total weekly working hours under alternative exact-matching (common-support) definitions. Estimates are reported as post-event averages over event times $\tau = 0$ to $+4$. The decomposition into extensive and intensive margins, as well as the implied share attributable to the extensive margin, is fully invariant across matching specifications.

Appendix C.8. Robustness: Alternative Event-Time Construction

Table C.13. Robustness to Alternative Event-Time Construction

Event-time bin	Labour Force Participation	Log Weekly Working Hours	Log Annual Labour Income
0–6 months	-0.004 (0.021)	-0.057 (0.063)	0.100 (0.158)
6–12 months	0.000 (0.021)	-0.031 (0.070)	0.176 (0.189)
12–24 months	-0.014 (0.016)	-0.019 (0.056)	0.112 (0.137)
24–30 months	-0.002 (0.013)	-0.043 (0.038)	0.114 (0.098)
Obs.	11,890	11,890	11,890
Individuals	2,088	2,088	2,088

Notes: This table presents robustness checks based on an alternative event-time construction using monthly interview and death dates, aggregated into six-month intervals. Post-event coefficients are reported relative to the pre-event baseline period. The estimates closely mirror those obtained under the annual event-time specification in terms of sign, magnitude, and temporal profile.

Appendix C.9. Robustness: Alternative Normalisations of Event Time

Table C.14. Robustness to Alternative Normalisations of Event Time

Event time	Baseline ($\tau = -1$)	Baseline ($\tau = -2$)	Pre-period average ($\tau = -2, -1$)
0	0.019 (0.016)	0.004 (0.012)	0.011 (0.011)
1	0.061*** (0.013)	0.046*** (0.016)	0.053*** (0.012)
2	0.040** (0.017)	0.025* (0.016)	0.032** (0.013)
3	0.047** (0.018)	0.033* (0.020)	0.040** (0.016)
4	0.048** (0.022)	0.034 (0.022)	0.041** (0.020)

Notes: This table examines the sensitivity of post-bereavement labour supply estimates to alternative normalisations of event-time coefficients. Estimates are reported under three normalisation schemes: $\tau = -1$, $\tau = -2$, and the average of $\tau = -2$ and $\tau = -1$. The timing, magnitude, and persistence of post-event responses are stable across normalisation choices.

Appendix C.10. Robustness: Leave-One-Country-Out (LOCO)

Table C.15. Leave-One-Country-Out (LOCO) Robustness Checks

Outcome	Baseline	LOCO mean	LOCO min	LOCO max
Panel A. Post 0–1 years				
Labour force participation	0.046	0.046	0.040	0.053
Log annual labour income	0.239	0.238	0.141	0.289
Log weekly working hours	0.196	0.196	0.172	0.213
Panel B. Post 1–3 years				
Labour force participation	0.049	0.049	0.040	0.056
Log annual labour income	0.381	0.381	0.261	0.444
Log weekly working hours	0.244	0.244	0.207	0.279

Notes: This table reports Leave-One-Country-Out (LOCO) robustness checks in which the baseline specification is re-estimated repeatedly while sequentially excluding one country at a time from the sample. Israel is excluded throughout due to data comparability considerations. Reported values include the baseline estimate, the mean estimate across LOCO replications, and the minimum and maximum estimates obtained from these exercises. The results indicate that the estimated post-event effects are not driven by any single country.

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Appendix C.11. Robustness: Placebo Timing Tests

Table C.16. Placebo Timing Tests

Placebo shift	Pre-trend joint p-value	Post joint p-value
Panel A. Labour force participation		
shift = 3	0.843	0.332
shift = 4	0.280	0.562
Panel B. Log weekly working hours		
shift = 3	0.434	0.069
shift = 4	0.395	0.153
Panel C. Log annual labour income		
shift = 3	0.546	0.652
shift = 4	0.396	0.769

Notes: This table reports joint significance tests from placebo timing exercises in which the event year is artificially shifted forward by three or four years. The pre-trend joint p-values test for differential trends prior to the placebo event, while the post-placebo joint p-values assess whether any systematic effects emerge in periods following the fictitious event timing. Across all outcomes and placebo shifts, the tests fail to detect statistically meaningful or persistent effects, supporting the validity of the baseline event timing.

Appendix C.12. Robustness: Baseline vs. Not-Yet-Treated Controls

Table C.17. Robustness to Control Group Definition: Baseline vs. Not-Yet-Treated Only

Event time	(1) Baseline	(2) Not-yet-treated only (Death $\geq t+3$)
Panel A. Labour force participation		
0	0.024	0.010
	(0.017)	(0.007)
1	0.064***	0.006
	(0.013)	(0.005)
Joint significance test	0.196	0.453
Panel B. Log weekly working hours		
0	0.149**	-0.018
	(0.053)	(0.024)
1	0.236***	0.010
	(0.043)	(0.016)
Joint significance test	0.002	0.682
Panel C. Log annual labour income		
0	0.165	0.008
	(0.143)	(0.066)
1	0.329**	0.056
	(0.129)	(0.043)
Joint significance test	0.105	0.953
Observations	961,925	22,421
Individuals	674,958	13,355

Notes: This table compares baseline event-study estimates with an alternative specification that restricts the control group to not-yet-treated individuals whose spousal death occurs at least three years after the cohort year. Although estimates under this specification are less precise due to the substantially reduced sample size, the direction of post-bereavement responses remains consistent with the baseline results.

Appendix D. Institutional Background

Appendix D.1. Classification of Spousal Death Types

Spousal death types are classified based on a combination of cause-of-death indicators, pre-death illness duration, hospitalisation history, and institutional care utilisation. In particular, sudden deaths correspond to cases in which `acute_true_i = 1`, aligning with the "sudden trajectory" described by Lunney et al. (2003), while all remaining deaths are classified as predictable.

Sudden death.

A death is classified as sudden if all of the following conditions are satisfied:

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- The primary cause of death corresponds to an acute medical event (e.g. myocardial infarction, stroke, or accidents).
- There is no indication of a chronic or terminal illness prior to death.
- There is no hospitalisation, or the hospital stay is shorter than one week prior to death.
- There are no repeated medical treatment records in the period preceding death.

Predictable death.

A death is classified as predictable if one or more of the following conditions apply:

- The cause of death is associated with chronic, terminal, or progressively worsening conditions (e.g. cancer, chronic respiratory disease, or infectious diseases with prolonged courses).
- The individual experiences an extended illness duration or repeated medical treatment prior to death.
- Hospitalisation lasts one week or longer, or there are multiple hospital admissions prior to death.
- There is evidence of sustained medical utilisation in the period preceding death.

Table D.1. Regional Grouping of European Countries

Region	Countries
Nordic	Denmark, Sweden, Finland
Western/Central Europe	Germany, France, Netherlands, Austria, Switzerland, Belgium
Southern Europe	Italy, Spain, Greece, Portugal
Eastern Europe	Poland, Czechia, Hungary, Slovakia, Estonia, Latvia, Lithuania

Notes: Regional classifications are based on OECD (2025), the European Commission *Ageing Report* (2024), Ferrera (2000), and Fenger (2007), reflecting similarities in pension systems, social protection regimes, employment protection legislation, and labour market structures relevant for older workers.

Appendix D.2. Key Institutional Indicators by Region

The institutional indicators reported below summarise region-level average characteristics using an ordinal classification scheme (Very high, High, Medium, Low), rather than cardinal measures. Classifications are constructed based on information from OECD *Pensions at a Glance* (2023–2025), the OECD Employment Protection Legislation database, the EU Labour Force Survey, and Eurostat Social Protection Statistics.

Ordinal levels: Very high > High > Medium > Low.

Net pension replacement rate.

- Nordic: High
- Western/Central Europe: Medium–high
- Southern Europe: Medium
- Eastern Europe: Low

Employment rate (ages 55–64).

- Nordic: High
- Western/Central Europe: Medium
- Southern Europe: Low
- Eastern Europe: Medium–low

Employment protection legislation (EPL) strictness.

- Nordic: Low
- Western/Central Europe: High
- Southern Europe: Medium
- Eastern Europe: Low

Public social expenditure (% of GDP).

- Nordic: Very high
- Western/Central Europe: High
- Southern Europe: Medium
- Eastern Europe: Low

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