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Work, Worship, and Welfare: How Earthquakes Reshape Labour Supply Preferences

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Abstract

We revisit a classic question in economics: how severe shocks to life circumstances affect the allocation of time individuals want to devote to work relative to worshiping and other non-market activities. We study stated labour-supply preferences, measured by respondents' views on whether placing less importance on work in life is a good thing, bad thing, or neither. We develop a reference-dependent preferences model in which earthquakes depress material living standards relative to consumption reference points and heighten the perceived value of non-market activities such as family time, religiosity, community engagement, and support for income redistribution. As these activities become more salient and time-intensive after a shock, they compete with labour for scarce time resources, lowering labour-supply preferences even when wages and employment conditions remain unchanged. We then take the theory to the data using a Difference-in-Differences design that merges district-level seismic intensity with individual-level longitudinal responses from 195,000 individuals in the World Values Survey across 96 countries. We find that earthquakes persistently increase acceptance of placing less importance on work, and this shift coincides with stronger valuation of non-monetary job attributes, higher religiosity, greater membership in religious organisations, and a temporary rise in support for redistribution.

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I Introduction

Do earthquakes change how people value work? Classical economics has long treated labour-supply preferences as the outcome of a trade-off between income, leisure, and non-market uses of time under risk and uncertainty. We study stated labour-supply preferences, measured by respondents' views on whether placing less importance on work in life is a good thing, bad thing, or neither. From Marshall (1890) and Pigou (1932) to Becker's (1965) theory of the allocation of time and the modern literature on background risk and prudence, a central question has been how shocks to risk and resources affect the willingness to work versus invest in other domains of life. Yet most empirical work still treats preferences over work as stable, and most theory abstracts from the possibility that large shocks might systematically tilt individuals toward non-market purpose and formal insurance. While extant literature has examined how demographics, education, cultural norms, and gender roles shape labour supply (Smith, 1977; Halman & Müller, 2006; Blau & Kahn, 2007; Duch & Taylor, 1993), it has largely overlooked a central behavioural question that we address: when earthquakes abruptly alter both material and psychological conditions, do individuals reassess the place of work in life?

We answer this question by combining a theoretical framework with global quasi-experimental evidence from earthquakes. We develop a tractable reference-dependent model in which individuals allocate time between labour, leisure, and non-market purpose activities. The latter includes both time-intensive pursuits (e.g., worship, family interaction, volunteering, and community participation) and goods-intensive actions (e.g., charitable giving and other redistributive donations) that yield spiritual, familial, and social returns rather than income. In the model, earthquakes raise mortality salience and may reduce material living standards, leading some individuals to fall into the loss domain of their reference-dependent

utility. These shocks elevate the perceived value of time-intensive non-market activities that compete directly with labour for scarce time resources. Simultaneously, as income losses place individuals in the loss domain, loss aversion makes additional income particularly valuable, generating a temporary demand for redistribution (e.g., post-quake relief). The predicted reduction in labour time therefore reflects not apathy or detachment, but a rational reallocation of time toward emotional, relational, and spiritual recovery.

Having established the theoretical backbone, we turn to a global empirical test. We treat earthquakes as plausibly exogenous shocks to both material circumstances and psychological states. Their timing is random, their impact localized, and their occurrence orthogonal to pre-existing labour trends. Leveraging these features, we implement a generalized Difference-in-Differences design that merges district-level seismic exposure with individual-level panel responses from 195,000 individuals in the World Values Survey (1995–2021) across 96 countries. This integration of global microdata with spatially variant seismic shocks allows us to estimate how earthquakes reshape stated labour-supply preferences, a behavioural dimension distinct from actual labour market outcomes, as well as religiosity, religious membership, family-life salience, and preferences for income redistribution.

Our contribution is fourfold. First, we extend the economics of natural disasters by focusing on labour-supply preferences, an attitudinal precursor to labour participation, rather than employment, wages, or assets alone (see, for example, Kirchberger 2017; Deryugina 2022). A separate strand shows that natural disasters can affect risk and time preferences (e.g., Hanaoka et al. 2018); to our knowledge, no work directly examines how disasters reshape preferences over the centrality of work itself. Second, we provide a formal framework for interpreting how non-market motivations can crowd out labour effort by distinguishing time-intensive from money-intensive purpose activities and deriving conditions under which work and purpose act as substitutes rather than complements, helping to account for het-

erogeneous post-disaster behaviour. Third, we introduce a behavioural framework grounded in reference dependence, loss aversion, and mortality salience to explain why disasters can reduce the centrality attached to labour effort. Finally, using harmonized microdata across countries, we provide the first cross-border quasi-experimental evidence that earthquakes increase acceptance of placing less importance on work and reorient the value placed on spirituality, job attributes, and redistribution.

The empirical evidence is consistent with the model's predictions. Earthquakes increase individuals' acceptance of placing less importance on work. Respondents in affected districts move 0.142 units toward lower labour-supply preferences, equal to 7.1% of the scale range, relative to pre-shock levels. These effects endure for at least five years and are most pronounced among men, older individuals, household heads, highly educated respondents, and those in the working and middle classes. Overall, our findings help explain why post-disaster recovery policies such as wage subsidies, employment programs, or reconstruction efforts may not fully restore pre-disaster work attachment. If earthquakes push people below reference points, reshape time preferences, and increase redistributive attitudes, rebuilding physical capital alone is insufficient; an effective recovery policy must realign incentives with transformed purpose-oriented behavioural priorities.

Our study relates to the labour supply and time-allocation tradition, from classical labour–leisure models to household production, behavioural labour, and post-disaster labour adjustments. Empirical studies of specific events show that earthquakes and storms reduce labour supply by lowering participation or shortening hours (Di Pietro and Mora 2015; Franklin and Labonne 2019; Di et al. 2020). Basile (2024) argues that changing preferences and aspirations, rather than demand shocks alone, underpin these declines. Related work in disaster political economy shows that earthquake fatalities depend not only on seismic intensity but also on collective mitigation capacity, which falls as inequality rises (Anbarci, Escaleras, and

Register 2005). Complementing these strands, field evidence indicates that workers adjust their labour supply to reach income targets or internal benchmarks, rather than responding smoothly to changes in wages or marginal incentives (Camerer et al. 1997; Farber 2005, 2008; Crawford and Meng 2011; Fehr and Goette 2007). We build on this literature by modelling labour, leisure, and non-market "purpose" activities as jointly determined under background risk.

Our study sits squarely within the behavioural literature on risk, reference dependence, and redistribution. Kimball (1990) and Eeckhoudt, Gollier, and Schlesinger (1996) show how background risk strengthens prudence and precautionary motives, while prospect theory (Kahneman and Tversky, 1979) and expectations-based reference dependence (Kőszegi and Rabin 2006, 2007) formalise how outcomes are evaluated relative to reference points. Recent studies provide direct evidence that effort and labour supply are reference-dependent (see Kaur, 2019; Kaur, Mullainathan, and Chethan, 2021). Besides, in public economics, Meltzer and Richard (1981) model rational demand for redistribution, and Kuziemko et al. (2015) document how support for redistribution responds to information about inequality and own rank. We integrate these strands by embedding mortality salience and reference-dependent material utility with loss aversion in a time-allocation model, and by deriving a spike-fade pattern in redistribution demand when shocks move individuals into and then out of the loss domain.

Our study connects to the economics of religion and social organisations, where religious participation is viewed both as a producer of club goods and as a form of informal insurance. Iannaccone (1992) models sacrifice and stigma in religious groups as mechanisms to curb free-riding and sustain mutual aid, while Barro and McCleary (2003, 2006) document cross-country correlations between religiosity, growth, and institutions. Recent work provides direct evidence that adversity itself raises religiosity. Bentzen (2019) shows that natural

disasters, especially earthquakes, increase religiosity across subnational districts worldwide. Bentzen (2021) also finds that the COVID-19 pandemic triggered a global surge in prayer. Related work on social capital and civic engagement emphasises the risk-sharing role of dense community networks. We contribute by treating religious and community engagement as time- and money-intensive "purpose" activities that compete with labour in the time budget and by providing quasi-experimental evidence that earthquakes causally increase religiosity and religious membership alongside shifts in labour-supply preferences and support for redistribution.

The remainder of the paper proceeds as follows. Section 2 presents the theoretical model. Section 3 describes the data and empirical setting. Section 4 outlines the identification strategy. Section 5 reports the main results, dynamic analyses, and robustness checks. Section 6 concludes with policy implications and avenues for future research on the behavioural foundations of labour supply.

II Theoretical model

Each individual in the society chooses (i) labour hours $\ell \in [0, 1]$, (ii) time spent in non-market purpose activities $\tau \geq 0$, (iii) goods devoted to non-market purpose activities $x_s \geq 0$, and (iv) material consumption $c \geq 0$.

By normalizing the individual's total time to 1 and denoting leisure by L, her time constraint is

$$\ell + \tau + L = 1.$$

With wage $w > 0$ and non-labour income $y \geq 0$, her budget constraint is

$$c + px_s = y + w\ell,$$

where p is the price of x_s.

Let $v(c)$ denote utility from consumption, with $v'(c) > 0$ and $v''(c) \leq 0$.

Material utility M is *reference-dependent* and *loss-averse* around a social material reference point r with loss-aversion parameter $\lambda > 1$. This utility has two domains, a gain domain and a loss domain:

$$M(c, r) = v(c) \quad \text{if } c \geq r, \tag{1}$$

$$M(c, r) = v(c) - \lambda[v(r) - v(c)] \quad \text{if } c < r, \tag{2}$$

We distinguish between two broad forms of *non-market purpose activities*, i.e., actions undertaken outside the market that provide meaning, identity, or social connection rather than material reward. The first type comprises *time-intensive* engagements, such as prayers, rituals, participation in religious services or organizations, spending time with family and friends, helping strangers, and volunteering. The second includes *money-intensive* activities, such as religious donations, charitable giving and other redistributive activies, the purchase of tithes and religious goods, or undertaking pilgrimages.

Taken together, these activities (whether they require time, material resources, or both) constitute what we term *non-market purpose activities* (N). They are produced jointly through allocations of time and goods that yield spiritual, social, and psychological returns rather than pecuniary ones:

$$N(\tau, x_s), \qquad N_\tau > 0, \quad N_x > 0, \quad N_{\tau\tau} < 0, \quad N_{xx} < 0, \quad N_{\tau x} \geq 0.$$

These activities scale with perceived probability of death $q \in (0,1)$, which rises after the earthquake.

Leisure yields standard utility $u(L)$ with $u'(L) > 0$ and $u''(L) < 0$.

Total utility is

$$U = M(c,r) + qN(\tau, x_s) + u(L).$$

The only shocks for individuals after the earthquake are given by the increase in q (i.e., the mortality salience) and possibly by the decrease in y as well (i.e., the resource loss).

In order to obtain an explicit $\partial \ell / \partial q$ and a simple sufficient condition, we use the following tractable specification:

$$v(c) = \log c, \qquad u(L) = \kappa \log L, \qquad N(\tau, x_s) = \alpha \log \tau + \beta \log x_s,$$

with $\alpha, \beta, \kappa > 0$,

where α measures how productive time-intensive non-market purpose activities are (time-intensity of those activities) and β how productive money-intensive non-market purpose activities are (money-intensity of those activities).

In this framework, the parameters α, β, and κ capture distinct dimensions of individual motivation and time allocation across market and non-market domains.

The parameter α represents the *productivity of time-intensive non-market purpose activities* (e.g., the benefit individuals derive from devoting time to activities such as prayer, meditation, religious rituals, family and social interactions, helping others, and volunteering). A higher α implies that each additional unit of time spent in these meaning-oriented engagements yields greater psychological or spiritual return.

The parameter β measures the *productivity of money-intensive non-market purpose activities*, such as charitable donations and other redistributive activities, pilgrimages, purchasing spiritual goods, or contributing to religious organizations. A larger β indicates that individuals obtain higher spiritual or emotional benefit from spending financial resources on such activities. Charitable and other donations, in particular, can be viewed as a manifestation of preferences for social solidarity or more equitable income distribution.

Finally, κ reflects the *valuation of leisure*, capturing how much individuals value personal rest or recreational time (both solitary and shared with family or friends) relative to work or other commitments. A higher κ means that leisure provides stronger utility, influencing the balance between labour, leisure, and non-market purpose activities in overall well-being.

Then the first-order conditions are

$$\begin{aligned}
\frac{p}{c} = \frac{q\beta}{x_s} \quad &\Rightarrow \quad x_s = \frac{q\beta c}{p}, \\
\frac{w}{c} = \frac{q\alpha}{\tau} \quad &\Rightarrow \quad \tau = \frac{q\alpha c}{w}, \\
\frac{\kappa}{L} = \frac{w}{c} \quad &\Rightarrow \quad L = \frac{\kappa c}{w}.
\end{aligned}$$

The time constraint $L = 1 - \ell - \tau$ gives

$$\ell(q) = 1 - \frac{(q\alpha + \kappa)c(q)}{w}.$$

Using $x_s = (q\beta/p)c$ in the budget constraint gives

$$\begin{aligned}
c + px_s = y + w\ell \quad &\Rightarrow \quad c + q\beta c = y + w - (q\alpha + \kappa)\, c, \\
c(q) &= \frac{y + w}{(1 + \kappa) + q(\alpha + \beta)}.
\end{aligned}$$

Therefore, we obtain

$$\ell(q) = 1 - \frac{(q\alpha + \kappa)c(q)}{w}.$$

By differentiating it, we get

$$\frac{dc}{dq} = -\frac{(y+w)(\alpha+\beta)}{\left[(1+\kappa)+q(\alpha+\beta)\right]^2} < 0,$$
$$\frac{d\ell}{dq} = -\frac{\alpha c + (q\alpha+\kappa)(dc/dq)}{w}.$$

Substituting $c(q)$ and dc/dq and simplifying gives

$$\alpha c + (q\alpha+\kappa)\frac{dc}{dq} = \frac{(y+w)(\alpha-\kappa\beta)}{\left[(1+\kappa)+q(\alpha+\beta)\right]^2}.$$

Hence,

$$\frac{d\ell}{dq} = -\frac{(y+w)(\alpha-\kappa\beta)}{w\left[(1+\kappa)+q(\alpha+\beta)\right]^2}.$$

Thus, we obtain

Proposition 1. *If $\alpha > \kappa\beta$, then $\partial\ell/\partial q < 0$.*

The economic intuition behind this result is straightforward. When non-market purpose activities are predominantly *time-intensive* relative to *goods-intensive* ones, after accounting for the importance of leisure (κ), an increase in mortality risk (q) induces individuals to shift their limited time away from work toward these activities. In this case, labour supply declines even when wages remain constant.

Formally, when $\alpha > \kappa\beta$, the marginal benefit of devoting time to time-intensive non-market purpose activities (prayer, meditation, social and family engagement, helping others, volunteering) exceeds the combined value of leisure and money-intensive activities (charitable giving, pilgrimage, religious donations, purchase of spiritual goods). This inequality implies that higher mortality salience leads people to reallocate *time*, not *income*, toward meaning-making. Because time is scarce, this adjustment necessarily comes at the expense of hours worked.

If non-market purpose activities are primarily *goods-based* (high β), individuals instead respond to heightened death risk by maintaining or even increasing labour supply, seeking to finance these activities through earnings. Conversely, if leisure itself is highly valued (high κ), time becomes expensive, and individuals may protect their leisure rather than devote additional hours to either work or spiritual pursuits, again dampening any decline in labour.

In essence, when spiritual or prosocial pursuits are *time-intensive*, work and non-market purpose activities compete for the same scarce resource (i.e., hours in the day) making them substitutes. When they are *money-intensive*, they become complements: pursuing them requires more labour income. Thus, the condition $\alpha > \kappa\beta$ delineates the regime in which post-disaster behaviour leads to lower labour supply despite unchanged wages, as individuals reorient effort toward activities that yield emotional and existential returns rather than monetary ones.

Remark. The loss-aversion parameter λ does not appear in the first-order conditions because the individual is assumed to operate on the *gain side* of the reference point, where consumption c is at least as large as the reference level r (i.e., $c \geq r$). In this region, the marginal utility of consumption is simply $M_c(c, r) = v'(c)$, and the kink in the reference-dependent utility function is inactive. If the individual falls *below* the reference point (i.e., $c < r$), the marginal utility of consumption jumps to the loss-domain slope. Since $\lambda > 1$, *material consumption becomes more urgent* in losses, so an extra hour of work is worth $w\lambda v'(c)$ at the margin. This raises the hurdle for reallocating time into non-market purpose activities as q increases. Thus, loss aversion dampens, but need not overturn, the decline in labour supply.

What about support for redistribution or post-quake relief financed by a tax? Would individuals have a higher preference for redistribution via a small proportional tax after the earthquakes, when $c < r$? How about when $c \geq r$?

Consider a policy parameter $m \geq 0$ that delivers a targeted *lump-sum transfer as post-quake relief only when the person is in the loss domain* (i.e., when $c < r$), financed by a small proportional tax with marginal burden $k > 0$ per unit of m.

Let $c_0 > 0$ be post-quake income without the lump-sum transfer. The consumption function with the transfer is

$$c(m) = c_0 + \mathbf{1}\{c_0 < r\}m - km.$$

If $c_0 < r$, then $c(m) = c_0 + (1 - k)m$. If $c_0 \geq r$, then $c(m) = c_0 - km$. Then

$$M_c(c, r) = v'(c) \quad \text{if } c \geq r,$$

$$M_c(c, r) = \lambda v'(c) \quad \text{if } c < r.$$

Let $U(m) = M(c(m); r)$ in order to measure the impact of m and k only.

In the loss domain, the marginal benefit and marginal cost are

$$MB = \lambda v'(c),$$

$$MC = kv'(c).$$

The individual wants more m as long as

$$\lambda v'(c) > kv'(c) \quad \Longleftrightarrow \quad \lambda > k.$$

Evaluating at $m = 0$, where $c = c_0$, the sign of $\partial U/\partial m$ at zero is proportional to

$$\lambda v'(c_0) - kv'(c_0) = v'(c_0)(\lambda - k).$$

Since $v'(c_0) > 0$, if $\lambda > k$, the derivative at zero is positive and $m^* > 0$.

If $\lambda \leq k$, the derivative at zero is non-positive, so the best choice is staying at the corner,

$m^* = 0$.

Now suppose the individual starts in the gain region and, by design, the targeted transfer m only kicks in for those in losses. If $c_0 \geq r$ and the shock does not push the individual into losses, she never qualifies for the transfer.

Then consumption is $c(m) = c_0 - km$ and remains in the gain domain for small m.

Utility is:

$$U(m) = M(c(m); r), \qquad M_c(c, r) = v'(c).$$

Thus,

$$\frac{\partial U}{\partial m} = M_c(c(m), r)(-k) = -kv'(c(m)) < 0 \quad \text{for all } m \geq 0,$$

because $k > 0$ and $v'(c) > 0$. Utility is strictly decreasing in m, and the unique optimum is at the lower bound $m^* = 0$.

This shows that in the gain domain, the preferred demand for redistribution is zero: there is no benefit and only cost.

Thus, we obtain

Proposition 2. *If targeted post-quake relief m is provided only when $c < r$ and has marginal financing cost k, then redistribution demand satisfies $m^* > 0$ in the loss domain when $\lambda > k$, and $m^* = 0$ in the gain domain.*

Hence, redistribution demand is strictly higher in the loss domain and "switches off" in the gain domain.

III Data and measurements

We combine two complementary data sources to estimate the causal effect of earthquake shocks on labour-supply preferences. Earthquake information is drawn from the United States Geological Survey (USGS), which provides globally harmonized data on the timing, location, and magnitude of seismic events. We restrict attention to earthquakes of magnitude 5.0 or higher between 1995 and 2021 and spatially match each event to the appropriate first-level administrative district using official global shapefiles. We then merge these district-level shocks with individual-level responses from the World Values Survey (WVS), assigning respondents to districts using the X048WVS geographic identifier. Because territorial classifications vary across countries and survey waves, we systematically select the most disaggregated administrative unit available to ensure spatial precision. After merging and removing unmatched observations, the final dataset contains 195,472 individuals across 1,485 districts in 96 countries.

We construct both a binary treatment indicator (earthquake occurrence) and continuous intensity measures based on magnitude. Our outcome variable captures stated labour-supply preferences, measured by respondents' views on whether "placing less importance on work in life" is a good thing, bad thing, or neither. We code the response as 1 = bad thing, 2 = do not mind, and 3 = good thing. Higher values therefore indicate stronger acceptance that work should become less central in life. Positive treatment effects can be read as lower stated labour-supply preferences, rather than as a change in observed hours or employment.

Figure 4 gives the raw intuition behind this coding. Among respondents in treated districts, the share saying that placing less importance on work is a "good thing" rises from 26.5 percent before earthquake exposure to 29.9 percent afterward. The indifferent response falls from 25.3 percent to 21.2 percent, while the share saying "bad thing" is nearly unchanged. These

unconditional shares do not identify a causal effect, but they show that the treated sample moves away from indifference and toward acceptance of lower labour-supply preferences in the same direction as the difference-in-differences estimates.

This data construction offers several empirical advantages. First, the treatment varies at the district level while outcomes vary at the individual level, permitting identification that is more granular than country-level disaster studies. Second, because both datasets span multiple survey waves, we can estimate not only average treatment effects but also dynamic responses before and after earthquakes. Third, the global coverage of both data sources enables us to examine whether behavioural adjustment to disasters is context-specific or systematic across institutional, cultural, and income environments.

A distinctive feature of our approach is the focus on stated labour-supply preferences rather than observed labour market behaviour. Preferences may shift even when realised labour supply does not, due to employment rigidities, liquidity needs, or family constraints. By isolating attitudinal responses to earthquakes, we capture a behavioural margin that precedes and potentially predicts later changes in labour market participation. This distinction is central to interpreting post-disaster labour responses not merely as market outcomes, but as changes in economic aspiration and time allocation priorities.

IV Identification and estimation framework

A Earthquakes as exogenous shocks

In our quasi-experimental research design, we treat earthquakes as a plausibly exogenous source of variation in labour-supply preferences. The identifying assumption is that both the timing and intensity of earthquakes are effectively random with respect to individuals' economic attitudes and behavioural trajectories. This claim is supported by several features of seismic activity.

First, geophysical randomness: large earthquakes are driven by tectonic processes that are fundamentally outside the realm of human agency and economic decision-making. Stress accumulation along fault lines is slow, silent, and largely undetectable until a sudden rupture releases energy. Although long-run seismic risk can be mapped, the precise year and magnitude of a given event remain unpredictable even to geologists. In other words, earthquakes follow the physics of plate movement, not the logic of labour markets. Thus, at the annual level of observation relevant for our analysis, the occurrence and strength of earthquakes constitute a shock that is orthogonal to individual preferences, local policy, or macroeconomic conditions.

Second, forecasting limitations: although modern seismology can identify broad zones of elevated seismic risk, its predictive power is inherently probabilistic and operates on geological time scales rather than on the annual resolution relevant for economic analysis. Even with satellite-based GPS measurements, fault-slip modelling, and real-time seismic networks, scientists can at best state that a rupture is likely within the next several decades. They cannot predict when, where along the fault, or with what magnitude an earthquake will strike in any given year. Thus, from the perspective of households, policymakers, and labour markets,

earthquakes arrive as abrupt, unplanned, and impossible to anticipate shocks that cannot be avoided through behavioural adjustment.

Third, exogeneity of physical severity: the magnitude of an earthquake is determined solely by the geological energy released at the fault line and is therefore unrelated to human, institutional, or economic conditions. While factors such as building codes, insurance coverage, urban density, or governance quality may shape the consequences of an earthquake (e.g., casualties, reconstruction costs, or displacement), they do not and cannot influence the physical force of the seismic event itself (Rahman, 2018). The ground shakes with the same intensity regardless of whether the district is wealthy or poor, well-governed or corrupt, densely populated or sparsely settled. This sharp separation between the natural mechanism of the shock and the human mechanisms of response reinforces the claim that earthquake severity is exogenous to labour-supply preferences. Overall, al of these three features, i.e., geophysical randomness, the impossibility of short-run forecasting, and the independence of physical intensity from socioeconomic conditions, justify treating earthquakes as an exogenous source of variation in our empirical analysis.

B Treatment and comparison groups

Our dataset covers 1,485 districts worldwide, of which 85 experienced at least one earthquake during a WVS interview year, while the remaining 1,400 recorded no seismic activity over the 1995–2021 period. Map 1 now displays the timing of first earthquake exposure rather than only the treated-control geography. The map shows that treatment is staggered across space: some districts first enter treatment early in the sample period, others enter after 2005 or after 2015, and most districts remain untreated. This staggered timing is the source of identifying variation in the generalized difference-in-differences design. Table 1 and

Figures 1 and 2 compare treated and untreated districts. Only 4.75 percent of respondents live in earthquake-exposed districts, while 95.25 percent form the control group. The mean earthquake magnitude in treated districts is 5.67, with shocks ranging from 5.0 to 7.3, indicating that the events captured are moderate to strong and therefore plausibly capable of generating both socioeconomic and psychological effects.

Because Difference-in-Differences estimation requires credible counterfactuals, comparability between treated and control districts is essential. Several potential threats merit consideration. First, districts with a history of earthquakes may have adopted institutional or infrastructural adaptations such as stricter building codes, insurance markets, or disaster-preparedness programs, which could correlate with labour-supply preferences. We address this concern by exploiting the randomness of timing and magnitude rather than the mere existence of seismic risk. Second, even where prior earthquakes create expectations, the precise intensity of any future event remains unpredictable, limiting anticipatory behaviour within treated districts. Third, spillovers may arise if neighbouring districts absorb displaced workers or resources, potentially blurring treatment boundaries. To mitigate such concerns, we include district fixed effects, year fixed effects, and district-specific linear time trends, thereby controlling for unobserved heterogeneity in both levels and long-run trajectories.

Our identification strategy does not require treated and untreated districts to have identical pre-shock levels of labour-supply preferences. Rather, the key assumption is that, absent an earthquake, the trends in preferences would have evolved in parallel across the two groups. While the parallel trends assumption cannot be verified directly in a setting with staggered treatment timing, we assess its plausibility using an event-study specification that traces the evolution of labour-supply preferences before and after earthquake exposure. The coefficient path shows no meaningful pre-treatment divergence between treated and control districts, with the exception of a small deviation two years prior to the shock (Figure 3). This pattern is

consistent with the identifying assumption that, absent an earthquake, treated and untreated districts would have followed similar trajectories.

Our analysis conceptualizes earthquake effects at the collective rather than individual level. Even when a respondent's home remains undamaged, the surrounding community infrastructure (e.g., roads, electricity, schools, markets, hospitals) may be severely disrupted. Because such shared resources underpin daily economic life, individuals can experience substantial consequences despite not suffering direct physical loss. For this reason, we define treatment at the district level, and our coefficients recover the average treatment effect of district-level exposure, rather than the effect of personal property damage. This approach captures the broader social, economic, and psychological shock transmitted through collective disruption, including changes in local labour markets, social interaction, and perceived economic security.

A limitation of the dataset is the absence of information on post-disaster relief programs. However, this omission likely biases our estimates toward zero. Relief interventions (e.g., financial transfers, reconstruction employment, food aid, and counselling) may cushion the effect of earthquakes on economic attitudes. By not conditioning on such programs, our estimates reflect the average effect of earthquake exposure net of any unobserved relief response. Thus, the observed decline in labour-supply preferences is likely a lower bound of the behavioural response.

The event-study estimates condition on district fixed effects, year fixed effects, district-by-year fixed effects, and individual covariates for age, sex, marital status, education, and subjective income. They show a clear decline in labour-supply preferences after earthquake exposure. The omitted period is the last pre-treatment event time, $t - 1$, and the specification traces effects from six pre-treatment periods through two post-treatment periods.

The absence of systematic pre-treatment divergence, together with the post-shock break in trend, supports the identifying parallel-trends assumption.

Figure A1 checks whether this conclusion depends on the small pre-treatment movement at $t-2$. When we re-estimate the event-study after excluding $t-2$, the post-treatment coefficients remain positive, persistent, and similar in magnitude to the baseline event-study estimates. This robustness check matters because a single pre-period movement can raise concerns in staggered difference-in-differences designs. Here, the estimated decline in labour-supply preferences does not depend on that event-time bin.

C Estimation method

We estimate the following equation to understand the causal connection between earthquake shocks and individuals' labour-supply preferences:

$$LSP_{idct} = \alpha_{dc} + \gamma_t + \theta_{dt} + \beta_1 Earthquake_{dct} + \pi X_{idct} + \varepsilon_{idct}. \tag{3}$$

where LSP_{idct} is the stated labour-supply preference of individual i in district d of country c in year t. In the specification, $Earthquake_{dct}$ captures the earthquake shock experienced by district d in year t of country c. The term α_{dc} denotes district fixed effects, γ_t denotes year fixed effects, and θ_{dt} represents district-specific linear time trends. X_{idct} is a vector of time-varying individual characteristics, such as sex, age, marital status, number of children, subjective income, and education level, introduced to mitigate omitted-variable bias and reinforce the causal interpretation. ε_{idct} is the idiosyncratic error term.

District fixed effects absorb all time-invariant geographic, institutional, and cultural characteristics that may correlate with both earthquake exposure and labour-supply preferences, ensuring identification comes from within-district changes over time. Year fixed effects purge

global and country-wide shocks (such as financial crises, pandemics, or technological shifts) that could otherwise confound treatment effects. District-specific time trends further account for gradual, district-level developments such as local policy reforms, infrastructure expansion, or region-specific economic cycles. This level of control is especially important in settings where treatment intensity varies across space, as it ensures that the estimated effect is not conflated with systematically evolving district characteristics.

Under this structure, any remaining divergence in labour-supply preferences between treated and untreated districts can be attributed to earthquake exposure, provided that both groups would have followed parallel trends. Our empirical strategy is designed precisely to satisfy that identifying requirement.

V Empirical results

A Benchmark results

The benchmark estimates show that earthquake exposure moves respondents toward lower labour-supply preferences, consistent with framing effects and reference-dependent adjustment after disasters. Using a DiD framework, Table 2 shows the impact of earthquake occurrence and intensity on individuals' labour-supply preferences by estimating Equation (3). All the columns present the results of the DiD estimation with one dummy measure and two intensity measures via ordinary least square estimators. Without having controlled for any sociodemographic or other covariates, the results show that individuals exposed to earthquakes record a 0.142-unit increase on the three-point WVS scale, equal to 7.1 percent of the scale range, relative to pretreatment levels and nonexposed individuals. Because higher values denote greater acceptance of placing less importance on work, this estimate in-

dicates a decline in stated labour-supply preferences rather than a direct change in observed hours or employment. Further estimations using spatially variant intensity measures, such as the earthquake average and earthquake maximum, reveal a stronger and more accurate representation of this effect, as these measures avoid potential biases from other concurrent shocks.

We extend the analysis by incorporating additional covariates for greater accuracy of estimation in Table 3. Our extended model retains the magnitudes and statistical power at the five percent level, implying that observed and unobserved biases do not affect the results. To explain this earthquake-induced decline in labour-supply preferences, we must exclude all other confounding variables that may influence the causal connection. Including a set of socioeconomic and demographic variables does not alter the coefficient of the earthquake in Column 2. However, alternative pathways could explain these results. We identify three plausible hypotheses and attempt to rule them out in Columns (3) through (5) in Table 3. When potential mediators, including life satisfaction, task autonomy, and postmaterialist values are controlled for, the results remain robust. Life satisfaction, a known determinant of workplace success (Oswald et al., 2015; Thompson & Bruk-Lee, 2020), does not significantly mediate this relationship, suggesting that lower labour-supply preferences are not driven primarily by life dissatisfaction. Similarly, autonomy at work, defined as employees' freedom and control over their tasks, which permits them to decide independently and flexibly (Chua & Ayoko, 2019; Forner et al., 2020), is often constrained in the postdisaster period, and has no significant mediating effect. Furthermore, postmaterialist values, whereby individuals prioritize nonmaterial well-being (Duch & Taylor, 1993), do not account for the change. Together, these findings suggest that the observed shift is consistent with framing effects, whereby earthquakes alter individuals' perceived value of time and effort relative to reference points shaped by the shock. The data do not allow us to observe reference-point shifts di-

rectly. However, we can estimate whether non-monetary job attributes and social, religious, and redistributive preferences move with labour-supply preferences after earthquakes.

B Purpose Reorientation and Loss Sensitivity: Co-Movement with Labour-Supply Preferences

Tables 4 and 5 show that the labour-supply response after an earthquake coincides with a broader reorientation of job, social, religious, and redistributive preferences. Table 4 shows that exposed individuals place greater weight on non-monetary job attributes, including job security, social respect, responsibility, and intrinsic interest. Their stated preference for leisure, by contrast, does not change statistically. Table 5 shows parallel changes in support for income redistribution, family life, human relationships, religiosity, religious-organization membership, and belief in hell. We therefore interpret these results as co-moving preference shifts, rather than distinct causal channels, that accompany the decline in labour-supply preferences.

This pattern is consistent with the theoretical framework. An earthquake raises mortality salience, q, increasing the marginal value of time-intensive non-market purpose activities, captured by α. Respondents appear to re-weight domains that provide meaning, identity, and social connection, both outside and within the labour market. Non-monetary job attributes can be viewed as one way purpose enters work: individuals still value employment, but they increasingly value jobs for security, respect, responsibility, and intrinsic meaning rather than hours or earnings alone. The insignificant leisure coefficient supports this interpretation. Leisure, governed by κ, reflects passive enjoyment rather than purpose-driven engagement, so it need not co-move with purpose-oriented activities.

The redistribution result is also consistent with reference-dependent preferences. If earthquake exposure moves individuals closer to, or below, their consumption reference point, loss aversion, $\lambda > 1$, raises the marginal utility of income in the loss domain and makes redistributive transfers more valuable. Demand for redistribution is therefore better read as heightened sensitivity to consumption shortfalls than as a separate causal channel. Because the WVS measures broad preferences for income equality rather than targeted post-quake relief, this evidence should be interpreted as consistent with, rather than a direct test of, the redistribution proposition. In the aftermath of the shock, mortality salience (q) and loss sensitivity (λ) operate through different margins but are jointly activated, shaping the observed co-movement between labour-supply preferences and non-market priorities.

Taken together, Tables 4 and 5 suggest that the fall in labour-supply preferences is part of a wider post-earthquake reallocation of attention toward work quality, social connection, religion, and redistribution. The evidence does not identify a single mediator. It shows that the labour-supply shift appears alongside a bundle of purpose-oriented and loss-sensitive preferences, as the model predicts.

C Dynamic treatment effects

To examine persistence, we estimate the benchmark model for labour-supply preferences with indicators for the year of the shock and two subsequent WVS waves. Because the WVS waves are spaced several years apart, t+1 corresponds to roughly four years after the initial shock and t+2 to roughly five years after it. Table 6 shows that the decline in labour-supply preferences persists for up to five years. The static model predicts the direction of adjustment after a rise in mortality salience; these dynamic estimates show that the attitudinal response lasts beyond the earthquake year. The coefficients are significant at the 5 percent level

in the earthquake year and at the 1 percent level in the first post-shock wave; the second post-shock wave remains positive and significant at the 5 percent level. This persistence is consistent with the idea that loss, injury, and post-disaster information continue to reshape social, psychological, and spiritual priorities after the immediate shock has passed.

D Robustness analyses

D.1 Impact of earthquakes on 'Ring of Fire' countries

An earthquake is a regular event in the 'Ring of Fire' countries, home to 90% of total seismic activity worldwide. In our sample, the largest share (almost 67 percent) of earthquake-exposed individuals resides in the 'Ring of Fire' countries. As a result, the impact of earthquake shocks on labour-supply preferences might be driven by these countries. If this reasoning holds, insignificant or weaker impacts should be observed in these countries. We test this argument in Table 7 and find no reasonable effect on labour-supply preferences. This finding suggests that our estimation is not driven by selection bias originating from these countries. One important insight from this estimation is that recurrent earthquakes do not compel the inhabitants of earthquake-prone countries to alter their work-related preferences and barely influence their cognitive decisions.

D.2 Falsification Tests: With pseudotreatment and comparison groups

Following Rahman et al. (2020), we conducted a falsification test by randomly dividing the treated group into T1 and T2 subgroups. The aim was to determine if there was a significant effect when the DiD model was applied, with T1 as the treated group and T2 as the pseudocontrol group. Since both subgroups were impacted by earthquakes, the analysis

should reveal no significant effect, as it compares treated individuals with other treated individuals. Column 1 of Table 8 supports this hypothesis, showing an insignificant effect of earthquake shocks.

Similarly, we performed another falsification test by randomly splitting the control group into C1 and C2 subgroups. We then estimated the DiD model, adopting C1 as the pseudotreatment group and C2 as the control group. Following the same logic as above, statistically insignificant effects were expected since neither group was affected by earthquakes. Column 2 of Table 8 presents this analysis and indicates no effect, suggesting that the main estimates were not solely due to statistical correlations with other factors. These falsification tests also help eliminate potential biases related to interdistrict migration, confirming that earthquake exposure did not cause migration to nearby unaffected regions.

D.3 External validity checks

In this study, our strategy for selecting a sample on the basis of individuals' exposure to earthquake shocks may not be entirely random. This is because individuals in the WVS dataset were chosen considering factors such as population density, urban-rural division, sex and employment status. This type of selection limits the possibility of randomization on the basis of individuals' prior exposure to earthquakes. As a result, our DiD sample may systematically exclude certain earthquake-affected individuals, potentially affecting labour-supply preferences and limiting the generalizability of our results to other types of shocks.

To address this concern, we divide the entire sample into four subgroups following Rahman et al. (2020): T1 and C1, T1 and C2, T2 and C1, and T2 and C2. We randomly selected half of the samples from each treated and control group and then conducted model estimation on these subgroups to test the robustness of the results. The estimates are presented in

Columns 3 to 6 of Table 8. The results show that the coefficients range from 0.103 to 0.181 and are statistically significant at the five percent level, except for the T2C2 group. These findings closely align with the full sample estimate of the dummy-based measure, which is 0.142 in Table 2. The consistency across different subsamples suggests that the results are robust and support the external validity of our findings.

D.4 Placebo test

Following Rahman et al. (2020), we randomly generated a placebo earthquake dummy by selecting individuals from the full sample, ensuring that each individual has an equal probability of being affected by earthquakes. The purpose was to confirm whether the estimates capture the real effects of earthquakes. The results of the benchmark model using this artificially created earthquake dummy are presented in Columns (1) to (6) of Table 9, and show no statistical significance. This suggests that our estimates are not a result of a spurious statistical correlation but rather reflect a genuine causal relationship.

D.5 Heterogeneities

The coefficient plot in Figure 5 documents lower labour-supply preferences among both the male and the female groups. Individuals aged above 50 years may attach less centrality to work after earthquakes because of health vulnerability, priority shifting and employment challenges (Cutter et al., 2003). Similarly, after being exposed to a shock, chief wage earners may choose to focus on family recovery, caregiving, rebuilding, or spiritual well-being rather than maintaining predisaster levels of labour market activity. Individuals with upper-level education are often employed in professional or specialized roles that depend heavily on established infrastructure, organizational support, and well-functioning markets. Earthquakes

disrupt these systems, leading to temporary or permanent job losses. As a result, highly educated individuals may find it less rewarding to continue working at the same level or with the same capacity. Earthquakes may destroy small businesses, or other income-generating assets for middle-income individuals, making it difficult for them to resume work. Lower class individuals show a significant positive causal association suggesting the urgency of re-entering the labour market for survival, whereas upper middle, lower middle- and working-class individuals might prioritize personal well-being over work following earthquakes (for details, see Tables A2 and A3 in the Appendix).

VI Conclusion

This paper shows that earthquakes shape not only labour market outcomes but also the underlying labour-supply preferences, redistributive attitudes, and behavioural priorities that govern labour supply decisions. Our analysis begins with a reference-dependent preferences model in which seismic shocks lower material living standards relative to reference points and heighten mortality salience. These changes jointly alter internal benchmarks for well-being and elevate the perceived value of time-intensive non-market activities, i.e., family commitment, spirituality, community participation, and emotional recovery. The model reveals that labour supply is not merely a function of wages or employment opportunities, but of a deeper "work–leisure–solidarity" calculus that reorganizes after catastrophic shocks.

A key implication of the theoretical framework is the state-contingent demand for redistribution in the loss domain. When individuals fall below their reference point, loss aversion steepens marginal utility and makes risk-pooling mechanisms, relief transfers, and broader income redistribution more attractive. This redistributive impulse weakens once individuals move above their reference point, fully disappearing in the gain domain. In the aftermath of

earthquakes, the time-intensive purpose channel can lower stated labour-supply preferences, while loss sensitivity raises the value of insurance and redistribution. The post-disaster choice to place less importance on work is thus not a withdrawal, but a behaviourally rational response to altered reference points, revised aspirations, and a temporary embrace of social insurance and solidarity.

Our empirical results are consistent with these theoretical predictions. Drawing on a global sample of 1,485 districts from 1995–2021 and a generalized DiD strategy with spatially variant intensity measures, we find robust evidence that labour-supply preferences systematically decline after earthquakes. A one-unit increase in earthquake magnitude raises the reversed WVS labour-supply-preference index by 0.025 units, indicating greater acceptance of placing less importance on work, with effects persisting for several years. These patterns are consistent with the model's predictions: earthquakes can push consumption below reference points, increase the subjective value of non-market purpose activities, and coincide with stronger redistributive preferences and non-monetary job priorities.

These findings help explain why post-disaster economic recovery is often slower than standard economic models predict. Neoclassical frameworks assume that labour supply rebounds with wage increases or infrastructure reconstruction. Our results show instead that disasters disrupt aspiration levels, alter the marginal utility of income, and invoke temporary but powerful redistributive preferences and social cohesion motives. Consistent with evidence that economic decisions involving immediate trade-offs engage affective rather than deliberative processes (Goette & Huffman, 2006; McClure et al., 2004; Shiv et al., 2005), labour-supply preferences after disasters reflect emotional and psychological recalibration rather than simple responses to labour-market incentives.

Our findings imply that effective recovery strategies must extend beyond rebuilding physi-

cal infrastructure and revitalizing labour demand. Interventions that address psychological well-being, strengthen community identity, and support redistributive preferences (such as temporary universal benefits, guaranteed income schemes, or disaster-contingency transfers) may be necessary complements to traditional economic policies. Moreover, measures aimed at stabilizing consumption relative to pre-disaster reference points, such as income stabilization programs or targeted aspiration-building, could counteract both the increase in redistribution demand and the decline in labour-supply preferences.

Finally, although earthquakes serve as exogenous shocks in our empirical design, the behavioural shifts they trigger (i.e., lower labour-supply preferences, heightened redistribution demand, and greater prioritization of non-market activities) interact with local norms, stigma, cultural expectations, and institutional contexts. Future research should explore how these forces jointly shape the trajectory of post-disaster labour dynamics, and whether similar preference re-anchoring and redistributive surges arise following pandemics, wars, or climate-related catastrophes.

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this manuscript, generative AI and AI-assisted technologies were used to support language editing, manuscript organization, LaTeX formatting, and the presentation of tables and figures. The authors reviewed and edited all AI-assisted output and take full responsibility for the content of the manuscript, including the accuracy of the empirical analysis, interpretations, citations, and conclusions.

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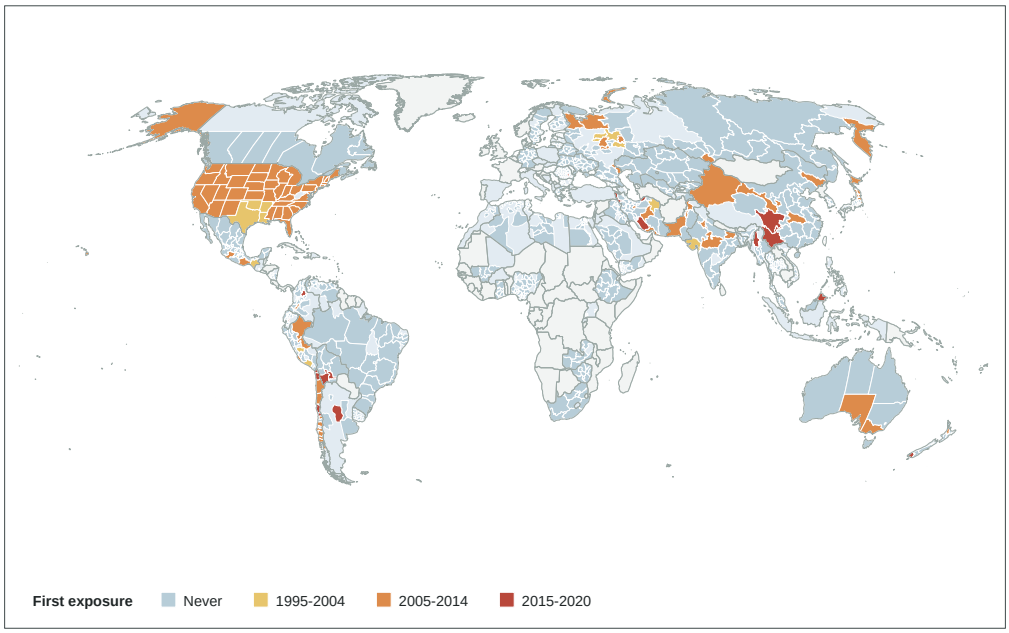
Maps, Figures, and Tables



Map 1: Timing of first earthquake exposure across WVS districts

Notes: This map shows the timing of first earthquake exposure for WVS districts matched to Natural Earth admin-1 boundaries. Blue areas denote districts that are never treated during the sample period; warmer colors denote districts first exposed in 1995–2004, 2005–2014, or 2015–2020. The main labour-supply analysis contains 195,472 individual-level observations, 1,485 WVS region codes, and 96 countries. Source: Authors' construction from USGS earthquake records matched to World Values Survey districts; boundaries from Natural Earth.

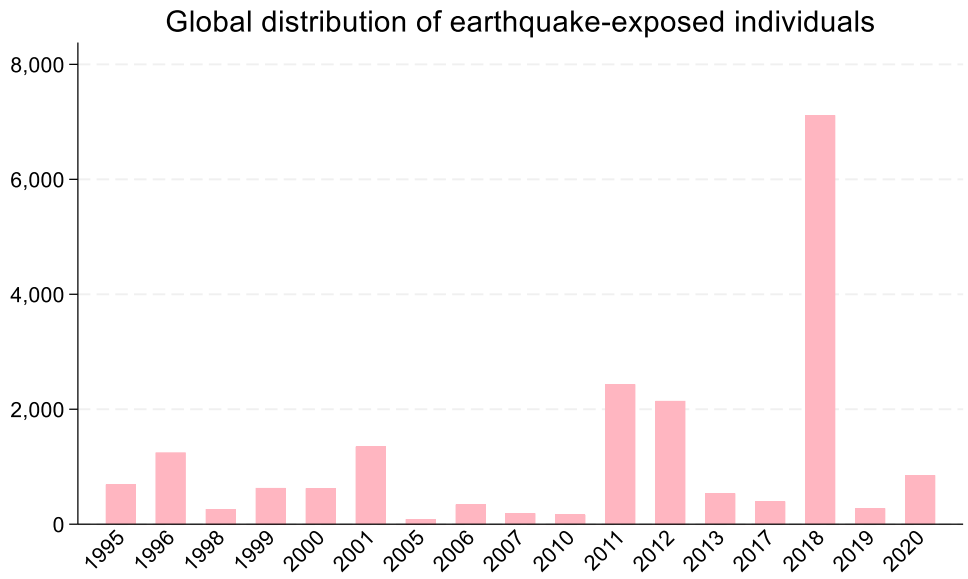


Figure 1: Global distribution of earthquake-exposed individuals over the treatment years

Notes: This figure plots the distribution of earthquake-exposed WVS respondents by treatment year in the matched WVS-USGS analysis sample, 1995–2021. Treatment years are assigned from USGS earthquake records matched to WVS district-year observations. Source: Authors' construction from USGS earthquake records matched to World Values Survey districts.

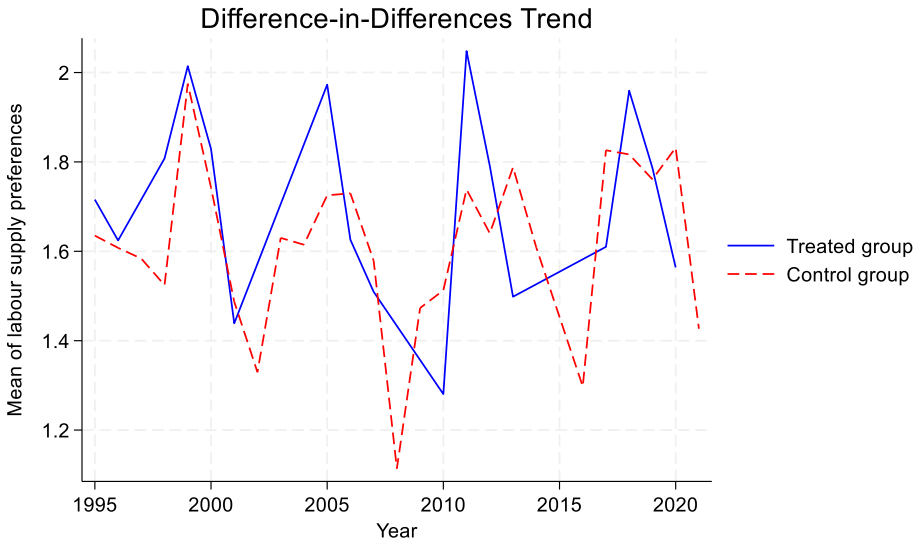


Figure 2: Comparisons of trends of labour-supply preferences for the treated and control groups over the years

Notes: This figure plots annual mean labour-supply preferences for treated and control districts in the matched WVS-USGS analysis sample, 1995–2021. Treated districts are those exposed to earthquake shocks under the baseline treatment definition; control districts are comparison districts not exposed in the corresponding treatment year. The outcome is the three-point World Values Survey measure of attitudes toward placing less importance on work.

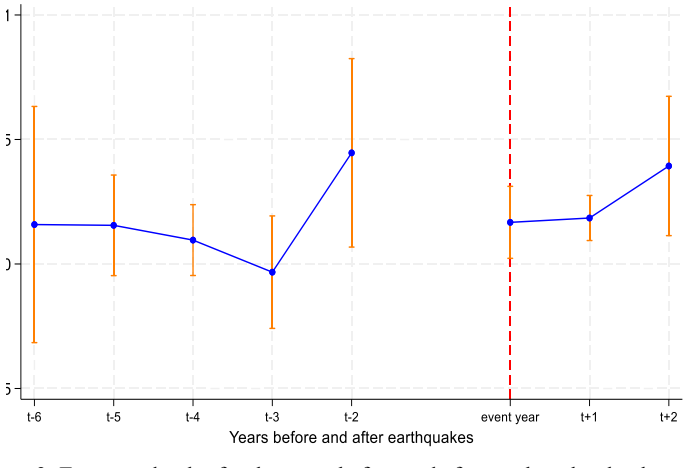


Figure 3: Event study plot for the years before and after earthquake shocks

Notes: This figure plots event-study coefficients from the generalized difference-in-differences specification estimated by ordinary least squares. The omitted reference period is $t-1$. Whiskers show 95 percent confidence intervals based on standard errors clustered at the district level. The specification includes district fixed effects, year fixed effects, district-by-year fixed effects, and individual-level controls. Sample: matched WVS-USGS labour-supply analysis sample; $N = 195{,}472$ individual-level observations.

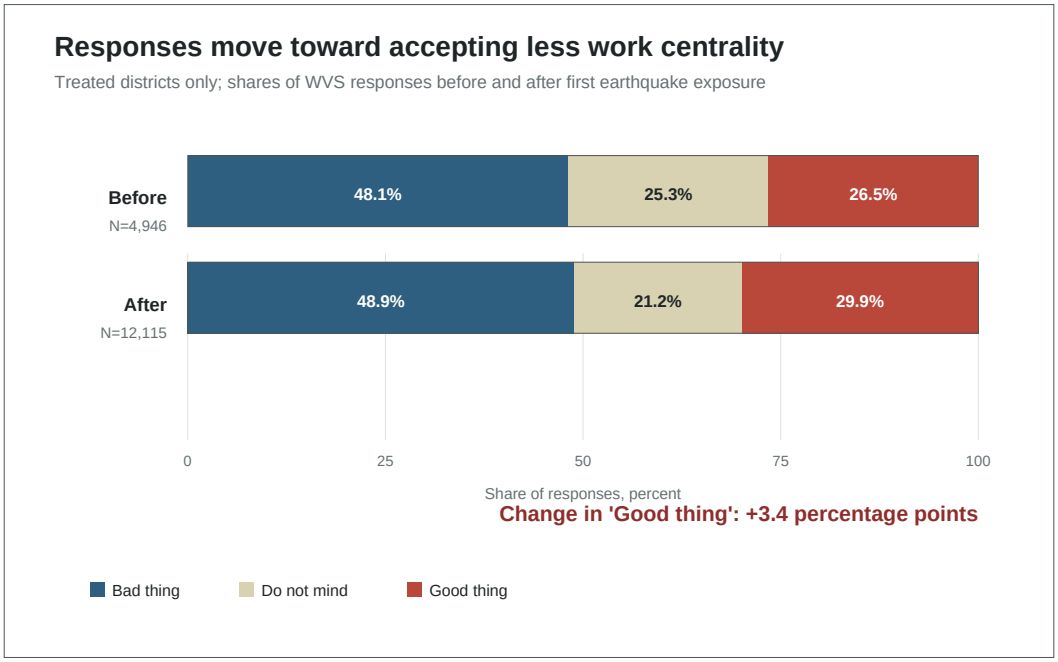


Figure 4: Responses Before and After Earthquake Exposure

Notes: This figure reports raw response shares among respondents in treated districts before and after first earthquake exposure. The outcome is the World Values Survey question on whether placing less importance on work in life is a good thing, bad thing, or neither. The pre-earthquake sample contains 4,946 observations and the post-earthquake sample contains 12,115 observations. The figure is descriptive and does not condition on district fixed effects, year fixed effects, district-by-year fixed effects, or individual covariates.

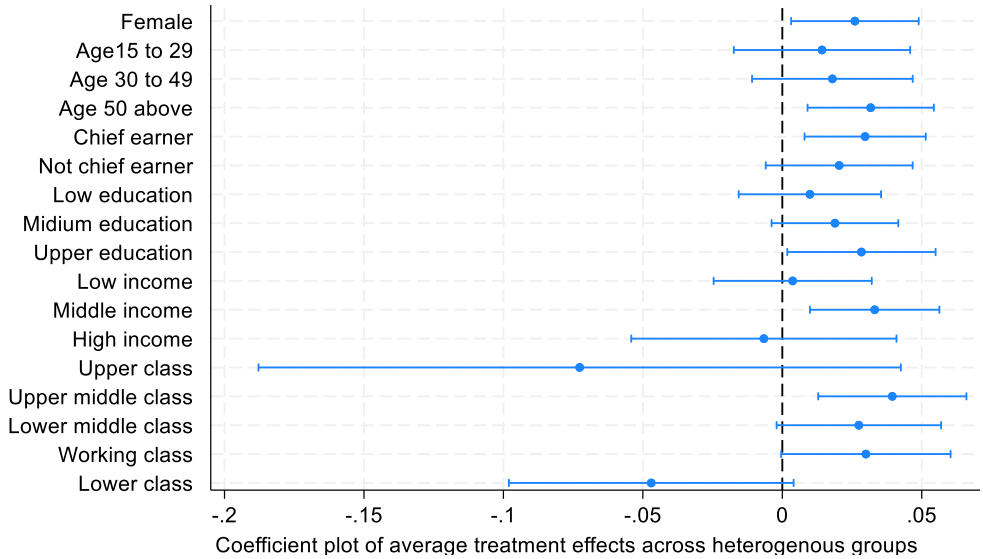


Figure 5: Effect of earthquake intensity (average) on heterogeneous groups

Notes: This figure plots coefficients from separate generalized difference-in-differences regressions of labour-supply preferences on average earthquake intensity by subgroup. Lines show 95 percent confidence intervals based on standard errors clustered at the district level. All regressions include individual-level covariates, district fixed effects, year fixed effects, and district-by-year fixed effects. Sample sizes vary by subgroup; see Tables A2 and A3.

Table 1: Descriptive statistics

	Full sample			Treatment group			Control group
Variable	EQ year=0	EQ year=1	Overall	EQ year=0	EQ year=1	Overall	EQ year=0
Age	41.173	42.509	41.256	42.512	42.509	42.510	41.136
	(15.867)	(15.935)	(15.915)	(15.867)	(15.935)	(15.915)	(15.773)
Sex dummy	0.493	0.500	0.494	0.511	0.500	0.503	0.493
	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)	(0.500)
Marital status	0.602	0.624	0.604	0.635	0.624	0.627	0.602
	(0.482)	(0.484)	(0.484)	(0.482)	(0.484)	(0.484)	(0.490)
Education level	2.049	2.077	2.050	2.259	2.077	2.129	2.043
	(0.727)	(0.757)	(0.753)	(0.727)	(0.757)	(0.753)	(0.748)
Subjective income level	1.839	1.804	1.837	1.969	1.804	1.852	1.835
	(0.724)	(0.614)	(0.652)	(0.724)	(0.614)	(0.652)	(0.612)
Labour-supply preferences	1.686	1.810	1.693	1.784	1.810	1.803	1.683
	(0.837)	(0.867)	(0.859)	(0.837)	(0.867)	(0.859)	(0.845)
Life satisfaction	7.001	7.437	7.028	7.463	7.437	7.445	6.989
	(1.968)	(2.100)	(2.063)	(1.968)	(2.100)	(2.063)	(2.262)
Autonomy index	0.070	0.113	0.073	0.133	0.113	0.119	0.068
	(1.170)	(1.109)	(1.166)	(1.156)	(1.109)	(1.123)	(1.170)
Postmaterialist index	1.782	1.814	1.784	1.961	1.814	1.857	1.777
	(0.621)	(0.624)	(0.622)	(0.658)	(0.624)	(0.637)	(0.620)
Preferences for income redistribution	5.957	5.707	5.942	5.501	5.707	5.648	5.970
	(2.833)	(3.002)	(2.955)	(2.833)	(3.002)	(2.955)	(2.983)
Good human relationship	1.377	1.360	1.377	1.333	1.360	1.342	1.381
	(0.510)	(0.480)	(0.509)	(0.545)	(0.480)	(0.524)	(0.507)
More emphasis on family life	1.010	1.011	1.021	1.201	1.211	1.311	1.101
	(0.349)	(0.373)	(0.349)	(0.341)	(0.373)	(0.354)	(0.349)
Self-reported religiosity	1.369	1.360	1.368	1.298	1.360	1.342	1.371
	(0.516)	(0.582)	(0.564)	(0.516)	(0.582)	(0.564)	(0.595)
Belief in hell	0.616	0.619	0.617	0.663	0.619	0.630	0.615
	(0.486)	(0.486)	(0.486)	(0.473)	(0.486)	(0.483)	(0.487)
Membership in religious organization	0.595	0.755	0.606	0.812	0.755	0.769	0.591
	(0.807)	(0.862)	(0.812)	(0.847)	(0.862)	(0.858)	(0.806)
Subjective health	2.059	2.048	2.058	1.926	2.048	2.012	2.062
	(0.802)	(0.814)	(0.812)	(0.802)	(0.814)	(0.812)	(0.834)
Chief wage dummy	0.458	0.457	0.458	0.514	0.457	0.474	0.456
	(0.500)	(0.498)	(0.499)	(0.500)	(0.498)	(0.499)	(0.498)

Source: Authors' compilation

Note: The numbers in each cell represent the mean value, with the corresponding standard deviations provided in parentheses.

Table 2: Benchmark estimation: Impact of earthquakes on labour-supply preferences

	Dependent variable: labour-supply preferences		
	(1)	(2)	(3)
EQ dummy	0.142**		
	(0.061)		
EQ average		0.025**	
(Moments magnitude scale)		(0.011)	
EQ maximum			0.022**
(Moments magnitude scale)			(0.011)
District fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes
Observations	195,472	195,472	195,472

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table 3: Adding controls: Impact of earthquakes on labour-supply preferences

	Dependent variable: labour-supply preferences				
	(1)	(2)	(3)	(4)	(5)
EQ average	0.025**	0.024**	0.023**	0.023**	0.025**
(Moments magnitude scale)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Age		0.003***	0.003***	0.003***	0.003***
		(0.001)	(0.001)	(0.001)	(0.001)
Age squared		-0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
Male		-0.005	-0.006	-0.007	-0.008
		(0.005)	(0.005)	(0.005)	(0.005)
Married		-0.031***	-0.029***	-0.027***	-0.027***
		(0.005)	(0.005)	(0.005)	(0.005)
Education		-0.004	-0.004	-0.008*	-0.010**
		(0.004)	(0.004)	(0.004)	(0.004)
Subjective income		0.021***	0.025***	0.022***	0.021***
		(0.005)	(0.005)	(0.005)	(0.005)
Life satisfaction			-0.007***	-0.006***	-0.006***
			(0.001)	(0.001)	(0.001)
Autonomy index				0.030***	0.028***
				(0.002)	(0.002)
Postmaterialist values					0.033***
					(0.005)
District fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	195,472	195,472	195,472	195,472	190,864

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table 4: Post-earthquake shifts in non-monetary job preferences

	Good job security (1)	Respected job (2)	Responsible job (3)	Interesting job (4)	Leisure important (5)
Pretreatment effect	0.297	3.090	6.861	0.197	0.136
	(0.199)	(2.260)	(6.407)	(0.238)	(0.209)
Posttreatment effect 0	0.273***	0.421***	0.347***	0.182***	0.143
	(0.000)	(0.000)	(0.000)	(0.000)	(0.118)
Posttreatment effect 1	1.026	8.734	29.124	-1.173	0.122
	(1.006)	(7.855)	(21.545)	(0.990)	(0.130)
District fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	54,813	54,813	54,813	54,813	208,241

Source: Authors' estimation

Note: The estimation method is generalized difference-in-differences using ordinary least squares. Estimates use individual-level observations, and each column reports a separate regression. Column (1) uses the indicator for whether respondents mention job security as important in a job; Column (2), whether they mention a respected job; Column (3), whether they mention a responsible job; Column (4), whether they mention an interesting job. These four variables are binary, where 1 = mentioned and 0 = not mentioned. Column (5) uses the importance of leisure in life, measured on a 4-point scale, where 1 = very important and 4 = not at all important. All variables are from the World Values Survey. Robust standard errors clustered at the district level are shown in parentheses. Pre-treatment effect denotes years before the shock; post-treatment effect 0 denotes the year of the shock; post-treatment effect 1 denotes the years after the shock. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

Table 5: Post-earthquake shifts in social, religious, and redistributive preferences

	Income redistribution (1)	Good human relationships (2)	Family-life emphasis (3)	Religiosity (4)	Religious organization (5)	Belief in hell (6)
Pretreatment effect	0.083	0.722	2.998	-0.039	0.119	-0.046
	(0.492)	(1.358)	(48.548)	(0.070)	(0.076)	(0.143)
Posttreatment effect 0	0.626**	-0.280***	-0.039***	-0.170***	0.091*	-0.152***
	(0.304)	(0.007)	(0.004)	(0.058)	(0.048)	(0.056)
Posttreatment effect 1	0.055	3.530	-2.637	-0.185***	0.203***	-0.113*
	(0.417)	(11.825)	(40.529)	(0.066)	(0.072)	(0.063)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	209,537	52,319	93,411	209,537	70,334	158,920

Source: Authors' estimation

Note: The estimation method is generalized difference-in-differences using ordinary least squares. Estimates use individual-level observations, and each column reports a separate regression with individual-level controls for age, sex, marital status, education, and subjective income. Column (1) uses preferences for income redistribution, measured on a 10-point scale, where 1 = there should be larger income differences and 10 = incomes should be made more equal. Column (2) uses good human relationships, measured on a 4-point scale, where 1 = understand others' preferences, 2 = express one's own, 3 = both, and 4 = other answer. Column (3) uses more emphasis on family life, measured on a 3-point scale, where 1 = good thing, 2 = do not mind, and 3 = bad thing. Column (4) uses self-reported religiosity, where 1 = religious person, 2 = not a religious person, and 3 = convinced atheist. Column (5) uses membership in a religious organization, where 1 = inactive member and 2 = active member. Column (6) uses belief in hell, where 1 = yes and 0 = no. All variables are from the World Values Survey. Robust standard errors clustered at the district level are shown in parentheses. Pre-treatment effect denotes years before the shock; post-treatment effect 0 denotes the year of the shock; post-treatment effect 1 denotes the years after the shock. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

Table 6: Dynamic treatment effects

	Dependent variable: labour-supply preferences		
	(1)	(2)	(3)
Earthquake year, t	0.121**	0.128**	0.135**
	(0.060)	(0.061)	(0.059)
Earthquake year, t+1		0.168***	0.172***
		(0.040)	(0.040)
Earthquake year, t+2			0.381**
			(0.151)
District fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes
Observations	195,472	195,472	195,472

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table 7: Benchmark estimation: Impact of earthquakes on labour-supply preferences with only Ring of Fire countries

	Dependent variable: labour-supply preferences		
	(1)	(2)	(3)
EQ dummy	0.084		
	(0.078)		
EQ average		0.015	
(Moments magnitude scale)		(0.013)	
EQ maximum			0.014
(Moments magnitude scale)			(0.013)
District fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes
Observations	54,509	54,509	54,509

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table 8: Falsification and external validity checks

	Dependent variable: labour-supply preferences					
	Falsification tests		External validity tests			
	T1 treated; T2 comparison	C1 treated; C2 comparison	T1C1	T1C2	T2C1	T2C2
	(1)	(2)	(3)	(4)	(5)	(6)
EQ dummy	0.033	0.013	0.103*	0.122**	0.145*	0.181**
	(0.050)	(0.026)	(0.058)	(0.052)	(0.076)	(0.078)
Age	0.008*	0.003***	0.004***	0.004***	0.003***	0.004***
	(0.004)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male dummy	-0.014	-0.005	-0.007	-0.006	-0.007	-0.004
	(0.018)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Married dummy	-0.033	-0.031***	-0.030***	-0.030***	-0.031***	-0.031***
	(0.023)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
Education	-0.003	-0.004	0.003	-0.004	-0.004	-0.007
	(0.021)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Subjective income	0.020	0.021***	0.021***	0.022***	0.020***	0.019***
	(0.018)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,284	186,188	97,736	97,738	97,735	97,737

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table 9: Placebo test: Impact of earthquakes on labour-supply preferences

	Dependent variable: labour-supply preferences					
	(1)	(2)	(3)	(4)	(5)	(6)
Placebo dummy	0.002	0.003	0.002	0.002	0.002	0.002
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Age		0.002**	0.002**	0.003***	0.003***	0.003***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared		-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male			-0.006	-0.005	-0.005	-0.005
			(0.005)	(0.005)	(0.005)	(0.005)
Married				-0.029***	-0.029***	-0.031***
				(0.005)	(0.005)	(0.005)
Education					-0.000	-0.004
					(0.004)	(0.004)
Subjective income						0.021***
						(0.005)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	195,472	195,472	195,472	195,472	195,472	195,472

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Appendices

Appendix A1: Data on earthquake

We use earthquake data from the United States Geological Survey (USGS) measured on the Moments magnitude scale from 1995-2021. We use three different measures of earthquakes: earthquake dummy (indicator based measure), earthquake average and earthquake maximum (intensity based measure). Earthquake dummy ensures spatial divisions of the world based on earthquake occurrence. Earthquake average and earthquake maximum signify the physical intensity of earthquakes in district d of country c during the year t. Our preferred measure for the model specification is average earthquake intensity, which includes all relevant spatial differences in earthquake intensity across affected districts.

We also include moderate-intensity earthquakes (magnitude 5 to 5.99) and strong earthquakes. Although moderate-intensity earthquakes may not be responsible for causing deadlier effects, property damages near the epicentre may happen. In addition, a small cluster of earthquakes may be a warning sign of eminent strong earthquakes. Furthermore, small earthquakes may be potentially damaging and have severe effects given the shallow source depth and closer proximity to population centres.

Appendix A2: Data on labour-supply preferences

In the WVS, respondents were asked to choose from a list of changes in the way of life that might occur soon. We use the question on work because it directly asks whether respondents view "placing less importance on work in our lives" as a good thing, a bad thing, or something they do not mind. We interpret this item as a measure of labour-

supply preferences: it captures whether individuals view a reduced role for work positively, negatively, or neutrally. The original WVS coding assigns 1 = good thing, 2 = don't mind, and 3 = bad thing. For interpretation, we reverse the scale to 1 = bad thing, 2 = don't mind, and 3 = good thing, so higher values indicate greater acceptance of placing less importance on work. A positive coefficient therefore indicates lower stated labour-supply preferences, not a direct change in hours worked, employment, or observed labour supply.

Appendix A3: Data on covariates and preference measures

Data on individual-level covariates, such as age, sex, marital status, education, subjective income, individuals' level of autonomy, and postmaterialist values, are sourced from the WVS dataset. The preference measures used in Tables 4 and 5 are sourced from the WVS as well. These measures include non-monetary job attributes (job security, respect, responsibility, and interest), leisure, preferences for income redistribution, good human relationships, and emphasis on family life. Preferences for income redistribution are measured on a 10-point scale, where 1 represents support for larger income differences and 10 indicates a preference for income equality. Good human relationships are measured on a 4-point scale, assessing individuals' ability to understand others' preferences, express their own, balance both, or offer alternative answers. Emphasis on family life is recorded on a 3-point scale, where responses range from viewing family life as a good thing to being indifferent or negative toward it.

Religiosity is captured through individuals' self-reported religiosity (1 = religious person, 2 = not religious, 3 = atheist), membership in a religious organization (1 = inactive member, 2 = active member), and belief in hell (1 = yes, 0 = no). These variables help describe whether social and religious preferences shift alongside post-disaster labour-supply prefer-

ences. Subjective health status is also available on a 5-point scale, from 1 (very good) to 5 (very poor), as a self-assessment of health conditions after adverse events.

Table A1: Dynamic treatment effects of earthquakes on labour-supply preferences (with controls)

	Dependent variable: labour-supply preferences		
	(1)	(2)	(3)
Earthquake year, t	0.115*	0.122**	0.129**
	(0.059)	(0.059)	(0.058)
Earthquake year, t+1		0.162***	0.165***
		(0.041)	(0.040)
Earthquake year, t+2			0.373***
			(0.142)
District fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes
Observations	195,472	195,472	195,472

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significance.

Table A2: Heterogeneities based on individuals' socioeconomic characteristics

	Dependent variable: labour-supply preferences										
	Sex			Age			Chief earner		Education		
	Male	Male	Female	15–29	30–49	50+	Chief	Not chief	Low	Middle	Upper
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EQ average	0.023*	0.023*	0.026**	0.014	0.018	0.032***	0.030***	0.020	0.010	0.019	0.028**
	(0.013)	(0.013)	(0.012)	(0.016)	(0.015)	(0.012)	(0.011)	(0.013)	(0.013)	(0.012)	(0.014)
Age	0.004***	0.004***	0.002**				-0.000	0.004***	-0.002	0.003**	0.009***
	(0.001)	(0.001)	(0.001)				(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Age squared	-0.000***	-0.000***	-0.000***				-0.000***	-0.000***	0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)				(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male				0.001	-0.000	-0.023***	-0.025***	0.006	-0.021**	0.001	0.004
				(0.007)	(0.007)	(0.008)	(0.008)	(0.006)	(0.009)	(0.006)	(0.007)
Married	-0.036***	-0.036***	-0.026***	-0.015	-0.037***	-0.021***	-0.029***	-0.034***	-0.030***	-0.029***	-0.030***
	(0.007)	(0.007)	(0.006)	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.010)	(0.007)	(0.008)
Education	-0.001	-0.001	-0.008	-0.007	0.003	0.006	0.002	-0.008			
	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)			
Subjective income	0.019***	0.019***	0.025***	0.012	0.027***	0.019**	0.022***	0.021***	0.030***	0.022***	0.007
	(0.006)	(0.006)	(0.006)	(0.008)	(0.006)	(0.008)	(0.006)	(0.006)	(0.009)	(0.006)	(0.007)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	96,467	96,467	99,005	54,999	82,257	58,190	89,512	105,955	50,098	85,262	59,988

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

Table A3: Heterogeneities based on individuals' socioeconomic characteristics

	Dependent variable: labour-supply preferences							
	Income status			Social status				
	Low income	Middle income	High income	Upper class	Upper middle	Lower middle	Working	Lower
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EQ average	0.004	0.033***	-0.007	-0.073	0.039***	0.027*	0.030*	-0.047*
	(0.014)	(0.012)	(0.024)	(0.059)	(0.014)	(0.015)	(0.015)	(0.026)
Age	-0.002	0.005***	0.009***	0.004	0.010***	0.005***	0.000	-0.007***
	(0.001)	(0.001)	(0.002)	(0.007)	(0.002)	(0.001)	(0.001)	(0.002)
Age squared	-0.000	-0.000***	-0.000***	-0.000	-0.000***	-0.000***	-0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male	-0.001	-0.005	-0.019	0.039	-0.002	-0.003	-0.017**	0.014
	(0.008)	(0.005)	(0.012)	(0.035)	(0.009)	(0.007)	(0.008)	(0.011)
Married	-0.027***	-0.031***	-0.057***	-0.036	-0.036***	-0.037***	-0.018**	-0.029**
	(0.008)	(0.006)	(0.014)	(0.044)	(0.010)	(0.008)	(0.009)	(0.013)
Education	-0.012*	0.003	-0.013	-0.018	-0.022***	0.007	0.008	-0.035***
	(0.007)	(0.005)	(0.011)	(0.031)	(0.008)	(0.006)	(0.008)	(0.011)
Subjective income				-0.010	0.004	0.012*	0.018**	0.071***
				(0.033)	(0.009)	(0.007)	(0.008)	(0.016)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55,563	116,269	23,479	3,091	40,457	73,049	52,626	21,648

Source: Authors' estimation

Note: The estimation method used is generalized difference-in-differences, employing ordinary least squares estimators. The individual-level observations are used, with the dependent variable from the World Values Survey: 'Do you think placing less importance on work in our lives is a good thing, bad thing or don't you mind?' We use this variable as a measure of individuals' labour-supply preferences. The response options include 1=bad thing, 2=don't mind, and 3=good thing. Our outcome variable reflects psychological and attitudinal shifts in individuals' preferences toward work, rather than their actual labour market participation or hours worked. The robust standard errors clustered at the district level are shown in parentheses. Asterisks: * for 10% level, ** for 5% level and *** for 1% level significant.

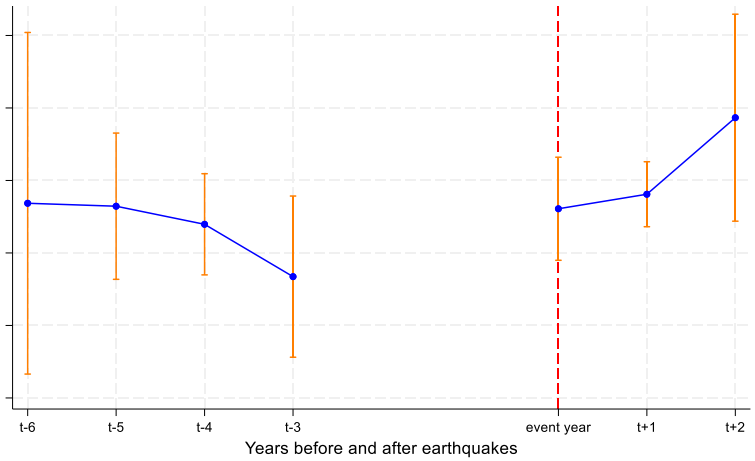


Figure A1: Event-Study Robustness Excluding Event Time $t-2$

Notes: This figure re-estimates the event-study specification after excluding event time $t-2$, the only pre-treatment bin with a small visible movement in the baseline event-study plot. The omitted reference period is $t-1$. Whiskers show 95 percent confidence intervals based on standard errors clustered at the district level. The specification includes district fixed effects, year fixed effects, district-by-year fixed effects, and individual-level controls. The post-treatment coefficients remain positive and persistent, indicating that the main dynamic result is not driven by the $t-2$ bin. Sample: matched WVS-USGS labour-supply analysis sample; $N = 195{,}472$ individual-level observations.