sociological science

Supplement to:

Ouyang, Chen. 2026. “Overwork Without Premium: The Persistent Class Gradient of Long Hours in China, 2006–2023” Sociological Science 13: 1079-1106.

Online Supplement to "Overwork Without Premium: The Persistent Class Gradient of Long Hours in China, 2006–2023"

Chen Ouyang
School of Marxism, Huazhong University of Science and Technology, Wuhan, China

Appendix A. Tables Referenced in the Article

The following appendix tables are cited in the article as tables in the online supplement.

Table A1: Sample flow by wave, CGSS 2006–2023

Wave	Raw	Aged 18–64	Employed	Nonfarm	Farm excl.	Occ. missing	Valid hours
2006	10,151	9,560	6,429	4,199	2,224	6	4,194
2008	6,000	5,541	3,831	2,432	1,382	17	2,403
2010	11,783	9,984	6,381	4,182	1,965	234	4,141
2011	5,620	4,677	3,248	2,011	1,150	87	1,993
2012	11,765	9,578	6,652	4,309	46	2,297	4,291
2013	11,438	9,364	6,283	4,278	1,872	133	4,254
2015	10,968	8,503	5,114	3,426	46	1,642	3,350
2017	12,582	9,596	5,847	4,193	28	1,626	4,133
2018	12,787	9,501	5,693	4,085	39	1,569	4,030
2021	8,148	5,887	3,278	2,351	22	905	2,267
2023	11,326	9,051	2,188	1,241	13	934	1,226
Total	112,568	91,242	54,944	36,707	8,787	9,450	36,282

Notes: Unweighted counts. "Farm excluded" drops agricultural occupations (ISCO major group 6 and subgroup 92) and, in 2006–2008, cases failing the wave-specific nonfarm screen; "occupation missing" drops employed respondents without a codable occupation. The final column is the analytic sample.

Table A2: Employed respondents without a codable occupation versus the analytic sample

	Analytic sample	Occupation missing	p
Age (years, mean)	39.4	48.1	<0.01
Female, %	42.6	48.1	<0.01
Urban residence, %	82.6	26.0	<0.01
College or above, %	30.5	5.7	<0.01
N (unweighted)	36,282	9,450	

Notes: Unweighted comparison of the analytic sample with employed respondents aged 18–64 who lack a codable ISCO occupation (Section 3.2). p-values are from Welch t tests (age) and chi-square tests (proportions).

Table A3: Class composition of overworkers and its decomposition, CGSS 2006–2023

Class	Share 2006	Share 2023	Total	Size	Rate	RR 2006	RR 2023
Managers & professionals	8.0	13.4	+5.4	+5.4	0.0	0.59	0.64
Semiprofessional & clerical	9.2	10.4	+1.2	+5.6	-2.8	0.73	0.55
Service & sales	10.7	17.6	+7.0	+3.9	+2.2	0.96	1.25
Manual workers	39.8	28.2	-11.5	-11.4	-0.6	1.14	1.22
Self-employed	27.8	28.2	+0.4	-1.0	+1.3	1.16	1.32
Employers	4.6	2.2	-2.4	-2.5	+0.0	1.14	1.24

Notes: CGSS 2006–2023, weighted. Share columns give each class's share of all overworkers, P(class | overwork). Change columns (2006–2023, pp) decompose the total into class-size and within-class-rate components. The representation ratio (RR) is a class's share of overworkers divided by its share of all workers.

Table A4: Robustness of the composition and price results

Specification	n	Key estimate	Conclusion
Baseline (48 h, weighted, all waves)	34,709	+0.39	No white-collar class closes the gap; semi-prof./clerical trend negative but marginal (-0.32 pp/yr, p = 0.07).
		(0.28)	
2010–2023 segment (post frame renewal)	28,129	+0.12	No convergence within the internally consistent segment.
		(0.35)	
ISCO-88 waves only (2006–2015)	23,419	+0.84*	Modest managerial–professional convergence within the ISCO-88 era.
		(0.40)	
Merge white-collar classes 3+4 (splice-immune)	34,709	+0.02	Combined white-collar trend is null; immune to the ISCO-88/08 changeover.
		(0.24)	
55-hour threshold	34,709	+0.55*	Modest convergence at extreme hours; service & sales +0.58 pp/yr (p < 0.01).
		(0.24)	
Drop 2021 (pandemic wave)	32,526	+0.39	Conclusions unchanged without the pandemic wave.
		(0.30)	
Drop 2023 (small subsample)	33,486	+0.50	Not driven by the small 2023 endpoint.
		(0.33)	
End at 2018 (drop 2021 and 2023)	31,303	+0.53	Same pattern before the COVID-era waves.
		(0.38)	
Unweighted	34,709	+0.20	Semi-prof./clerical divergence significant only here (-0.44 pp/yr, p < 0.01).
		(0.24)	
Trim hours > 84	33,811	+0.38	Robust to trimming extreme hours reports.
		(0.28)	
Core working ages 30–54 (M1)	24,173	+0.62*	Modest managerial–professional convergence at core ages.
		(0.31)	
Core working ages 30–54 (M2, ln hourly wage)	16,446	-0.486†	Penalty intact; all 11 wave coefficients negative and significant.
		(0.028)	

Continued on next page

Table A4 (continued)

Specification	n	Key estimate	Conclusion
Donut: drop 44–52 h band (M2)	19,161	-0.648†	Penalty survives excluding the threshold-misclassification band.
		(0.021)	
2012–2023 segment, no added controls (M1)	23,112	+0.24	Comparison baseline for the added-controls check.
		(0.38)	
2012–2023 + establishment size and contract (M1)	23,112	+0.19	Gradient trends essentially unchanged.
		(0.41)	
2012–2023 + establishment size and contract (M2)	15,963	-0.502†	Penalty robust to firm-size and contract controls (baseline -0.508).
		(0.030)	
Cha–Weeden-comparable: full-time, 50 h (M2)	22,110	-0.396†	Penalty holds under the American study's design; annual-earnings CI rules out premiums above 1.5 percent.
		(0.020)	
49-hour threshold (excludes the 48-hour heap)	34,709	+0.51	Gradient conclusions unchanged; no nonmanual class converges.
		(0.28)	
2010–2023 + industry fixed effects (M2)	18,174	-0.511†	Penalty not an artifact of industry composition (baseline -0.512); state-sector differential unmoved (-18.0 vs -18.2).
		(0.028)	
2010–2023, SEs clustered on 151 counties (M1)	28,129	+0.12	Clustering on the CGSS primary sampling units changes no conclusion.
		(0.31)	

Notes: CGSS 2006–2023. M1 rows report the managers & professionals × year interaction (percentage points per year) except the merged-class row; M2 rows report the pooled overwork coefficient on ln hourly wage. All specifications include the full covariate set and province fixed effects with province-clustered standard errors (county-cluster row excepted); all are weighted unless noted. Under a multiplicity correction across the ten M1 specifications, none of the three nominally significant convergence estimates survives (smallest Holm-adjusted p = 0.22; Section 4.6). Cluster-robust standard errors are in parentheses below key estimates; for this compact summary, they are recovered from the archived coefficient and two-sided Wald p-value output. *p < 0.05; †p < 0.01.

Appendix B. Nonlinear and Sub-Period Analyses

The main text estimates full-period trends and reports direct sub-period contrasts. This online supplement evaluates whether curvature or structural change could be obscured by a single linear trend, with particular attention to the post-2015 rebound in overwork, the managerial-professional class, and the adjusted wage association.

The analyses combine unrestricted wave contrasts with quadratic and piecewise-linear specifications. The two central conclusions of the article remain unchanged: the class ordering does not reverse, and the adjusted hourly-wage association remains negative in every wave. The additional models refine the timing of change within those patterns.

Specifications

All models retain the locked pipeline of the main analysis: province names harmonized to 31 clusters, survey weights normalized within wave, employee earnings winsorized at the 1st and 99th percentiles within wave, weighted least squares with province fixed effects, and standard errors clustered on province. We add four nonlinear strategies. First—and least dependent on functional form—direct adjusted sub-period contrasts: two-wave comparisons of the outcome between 2015 and 2021, and between 2015 and 2023 (and, for wages, wave fixed-effects contrasts such as 2018 vs. 2010 and 2021 vs. 2010), which require no choice of curve at all. Second, a quadratic time specification adds year-squared (interacted with class, for the gradient) to test for curvature. Third, piecewise-linear splines (segmented regression) split each trend into an early slope, a change in slope at a knot, and a late slope; the composition knot is placed at 2015 (the emergence of 996) and the price knot around 2010–11. Because the price knot is located only after inspecting the trajectory, we treat the spline as an exploratory complement to the knot-free contrasts and verify that placing it at 2010 instead, in series ending in 2018 or in 2021, leaves the conclusions unchanged. Fourth, an inverse-variance meta-regression on the eleven published by-wave penalty coefficients provides a transparent cross-check that uses only the numbers already printed in Table 3. Composition models are estimated at both the 48-hour and 55-hour thresholds; prevalence and gradient slopes are reported in percentage points per year and penalty slopes in log points per year. Figures plot descriptive weighted rates and coefficients with the fitted nonlinear curves; the tables carry the covariate-adjusted inference. Because the 2021 wave was fielded under pandemic conditions with a reduced sample, every model is also re-estimated with 2021 excluded (or, for the price splines, in series ending in 2018).

The prevalence rebound: real between 2015 and 2021, not sustained through 2023, and shared across classes

The weighted overwork rate falls from 64.7 percent in 2006 to a trough of 51.7 percent in 2015, edges up through 2017–18, rises to 62.2 percent in the 2021 pandemic wave, and returns to 53.1 percent in 2023 (Figure S1). The knot-free contrasts in Table S1 quantify the rebound directly, and it is real: between 2015 and 2021 the covariate-adjusted 48-hour rate rose by 6.05 percentage points ($p < .001$), and a piecewise model estimated through 2021 puts the 2015–2021 slope at +0.56 points per year ($p = .002$) against a pre-2015 slope of -0.21 ($p = .191$). Two features, however, keep this rebound from marking a new trajectory. It did not persist: the adjusted 2015–2023 difference is +2.76 points ($p = .241$), and no class-specific 2015–2023 contrast approaches significance. And it was not led by

professionals: the 2015–2021 increase is largest for manual workers (+8.46 points, p = .003) and the self-employed (+8.20, p = .023), comparable for managers and professionals (+6.20, p = .055), and absent for the other nonmanual classes, so the managerial-minus-manual gap did not narrow (change −3.68 points, p = .391).

Table S1: Direct adjusted sub-period contrasts in the 48-hour overwork rate, relative to 2015. Percentage points; standard errors in parentheses.

Group	(1) 2021 - 2015 (pp)	(2) 2023 - 2015 (pp)
Overall	+6.05†	+2.76
	(1.42)	(2.35)
Manual workers	+8.46†	+1.94
	(2.81)	(3.65)
Self-employed	+8.20*	+3.73
	(3.60)	(3.96)
Managers & professionals	+6.20	+3.52
	(3.23)	(5.59)
Semi-prof. & clerical	-3.80	+0.60
	(3.63)	(4.97)
Service & sales	-0.86	+3.66
	(4.80)	(6.28)
Employers	+5.08	-6.64
	(11.64)	(11.27)
Δ (Mgr. & prof. - manual) gap	-3.68	-2.82
	(4.29)	(6.12)

Notes: Each cell is the covariate-adjusted difference in the 48-hour overwork rate between the end wave and 2015, from a two-wave weighted LPM with education, age and its square, gender, hukou status, urban residence, and province fixed effects; standard errors clustered on province. The gap row is the post-by-class interaction from a model restricted to managers and professionals and manual workers. A piecewise-linear model estimated through 2021 gives adjusted slopes of -0.21 (0.191) pp/yr before 2015 and +0.56 (0.002) pp/yr for 2015–2021 (slope change +0.77 (0.005)). Source: companion sub-period analysis (code/12_nonlinear_subperiods.py). Standard errors are in parentheses below coefficients. *p < 0.05; †p < 0.01 (two-tailed).

A quadratic fitted to the full period, including 2023, summarizes the same verdict: the year-squared term is insignificant at either threshold (48 hours, p = .686; 55 hours, p = .809), and the implied turning point (about 2013) leans on the elevated 2021 wave—dropping that wave flips the sign of the (still insignificant) curvature (Table S2). The rebound, in short, is real but temporary and 2021-sensitive: it culminates in, and is heavily influenced by, the elevated 2021 wave, and does not persist through 2023.

The class gradient shows no significant nonlinearity; the one extreme-hours signal predates 2015

The gradient is where an elitization would first appear, so we test it most carefully. A quadratic specification finds no significant curvature for any class, and a joint test that all five class-by-year-squared interactions are zero is nowhere near significance ($\chi^2(5) = 2.70$, p = 0.746). A piecewise-linear model with a knot at 2015 tells the same story at the 48-hour threshold: no class registers a significant change in slope at 2015 or a significant late-period slope, and the managerial–professional trend, weakly positive before 2015, is flat to slightly negative afterward (Table S3). Figure S2 shows why: managers, service workers, and manual workers all trace the same V-shaped cycle—down to about

Table S2: Aggregate prevalence of overwork: linear versus quadratic time trend.

Threshold and sample	(1) Linear year (pp/yr)	(2) Quadratic year² (pp/yr²)	Turning year
≥48 h, all waves	+0.01	+0.006	2013
	(0.09)	(0.016)	
≥48 h, excl. 2021	-0.05	-0.005	2009
	(0.10)	(0.017)	
≥55 h, all waves	-0.03	-0.007	2012
	(0.11)	(0.028)	
≥55 h, excl. 2021	-0.04	-0.008	2011
	(0.12)	(0.033)	

Notes: Weighted least squares with education, age and its square, gender, hukou status, urban residence, and province fixed effects; standard errors clustered on province. The linear column reports the year slope (with its p-value) from the linear model; the quadratic column reports the year-squared coefficient from the quadratic model. The turning year is the vertex implied by the quadratic fit. pp/yr = percentage points per year. Standard errors are in parentheses below coefficients. *p < 0.05; †p < 0.01 (two-tailed).

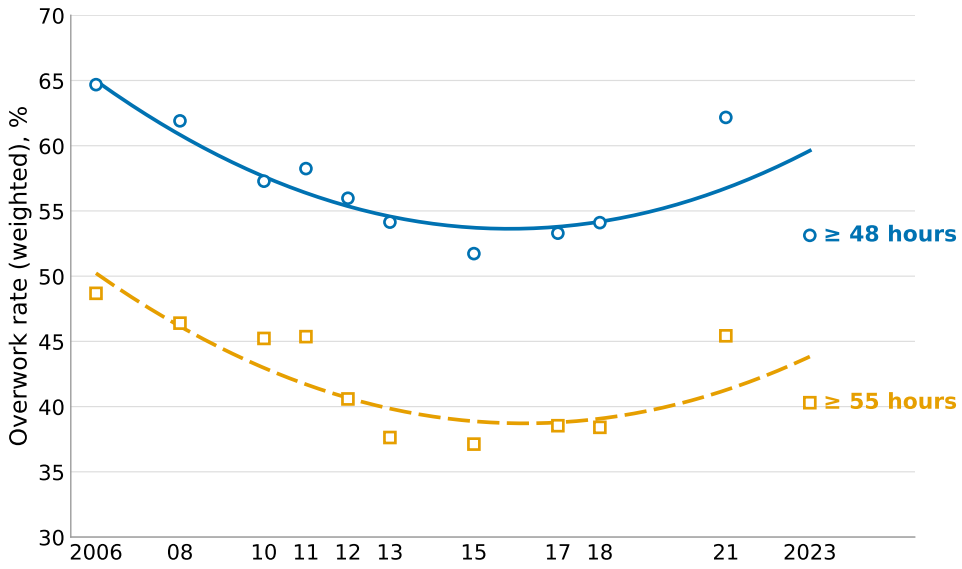

Figure S1: Weighted overwork rate at the 48- and 55-hour thresholds, with quadratic fits. The rebound culminates in the elevated 2021 pandemic wave and does not persist through 2023; the full-period quadratic curvature is not statistically significant (Table S2), while the direct 2015–2021 contrast is (+6.05 pp, p < 0.01; Table S1).

2015, up thereafter—but the three lines stay parallel. The mid-2010s rebound is a shared macro movement, not a class-specific convergence, which is exactly why the differential trends are insignificant.

Table S3: Class gradient of overwork, nonlinear specifications (48-hour threshold). Slopes are relative to manual workers; standard errors in parentheses.

Class	(1) Quadratic year² (pp/yr²)	(2) 2006–2015 (pp/yr)	(3) Change at 2015 (pp/yr)	(4) 2015–2023 (pp/yr)
Managers & professionals	-0.039	+0.69	-0.83	-0.14
	(0.046)	(0.45)	(0.84)	(0.57)
Semi-prof. & clerical	+0.015	-0.27	-0.20	-0.47
	(0.037)	(0.39)	(0.79)	(0.48)
Service & sales	+0.002	+0.44	-0.34	+0.10
	(0.032)	(0.38)	(0.70)	(0.46)
Self-employed	-0.013	+0.14	-0.13	+0.01
	(0.032)	(0.32)	(0.62)	(0.44)
Employers	+0.056	-0.45	+1.23	+0.78
	(0.109)	(0.74)	(2.02)	(1.45)

Notes: Weighted least squares with the full covariate set and province fixed effects; province-clustered standard errors. The quadratic column reports each class-by-year-squared interaction; the joint test that all five equal zero gives $\chi^2(5) = 2.70$ ($p = 0.75$). The last three columns come from a piecewise-linear spline with a knot at 2015: the early and late differential slopes and the change in slope at the knot. pp/yr = percentage points per year. Standard errors are in parentheses below coefficients. *p < 0.05; †p < 0.01 (two-tailed).

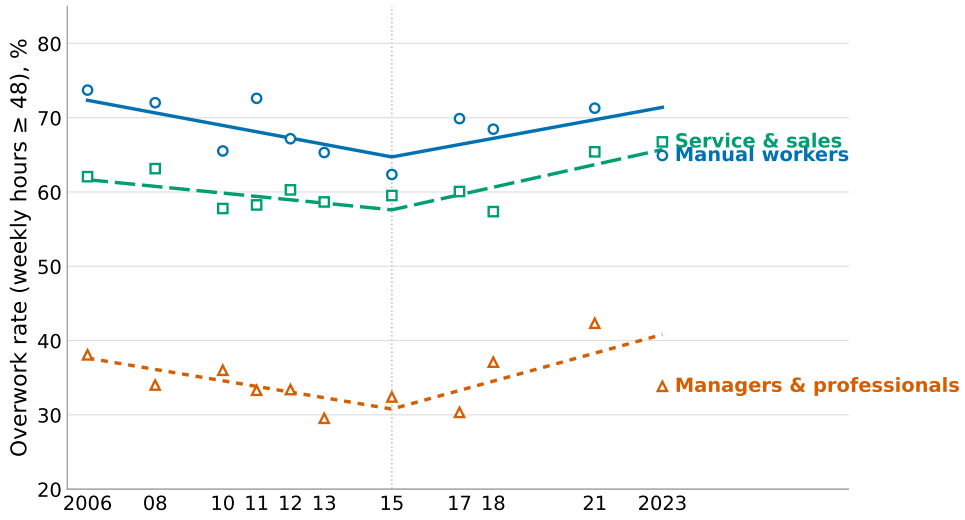

Figure S2: Overwork rate by class with piecewise-linear fits (knot at 2015). Points are weighted wave rates; lines are segmented fits. The three classes share a common V-shaped cycle, and the managerial–professional line remains far below and roughly parallel to the manual and service lines throughout.

Managers and professionals: a suggestive but non-significant post-2015 rise, sensitive to the pandemic wave

Examined on its own, the managerial–professional overwork rate does drift upward after 2015—a potentially relevant pattern. The rise is not statistically significant, however (late-period slope +0.52 pp/yr, p = .319), roughly halves when the 2021 pandemic wave is excluded (+0.27 pp/yr, p = .675), and disappears entirely at the 55-hour threshold (Table S4). The knot-free contrasts agree: their own 2015–2021 change is +6.20 points (p = .055), fading to an insignificant +3.52 by 2023 (p = .529). It leaves managers and professionals at 33.8 percent overworked in 2023, still roughly thirty points below manual and service workers. The extreme-hours margin is more informative and cuts the other way: relative to manual workers, the managerial 55-hour rate rose significantly across 2006–2015 (+1.14 pp/yr, p = .004) and then reversed significantly at 2015 (change −1.58 pp/yr, p = .048). The convergence the main text discloses at the extreme tail is thus a pre-996 phenomenon that did not continue into the 996 era—evidence that reinforces, rather than unsettles, the paper's timeline argument.

Table S4: The extreme-hours margin and managers' own trajectory, piecewise-linear specifications (knot at 2015).

Specification	(1) 2006–2015 (pp/yr)	(2) Change at 2015 (pp/yr)	(3) 2015–2023 (pp/yr)
Mgr. & prof. vs. manual, 55 h	+1.14†	-1.58*	-0.44
	(0.40)	(0.80)	(0.54)
Service & sales vs. manual, 55 h	+0.47	+0.22	+0.68
	(0.46)	(0.95)	(0.54)
Mgr. & prof., own rate, 48 h	-0.23	+0.75	+0.52
	(0.40)	(0.79)	(0.52)
Mgr. & prof., own rate, 48 h (excl. 2021)	-0.19	+0.46	+0.27
	(0.40)	(0.88)	(0.64)
Mgr. & prof., own rate, 55 h	-0.01	+0.07	+0.05
	(0.38)	(0.78)	(0.49)

Notes: Rows 1–2 report differential slopes relative to manual workers at the 55-hour threshold; rows 3–5 report the managerial–professional class's own overwork rate. Weighted least squares with the full covariate set and province fixed effects; province-clustered standard errors; standard errors in parentheses. Standard errors are in parentheses below coefficients. *p < 0.05; †p < 0.01 (two-tailed).

The wage penalty followed a genuine nonlinear path—a shrinking penalty, not an emerging premium

On the price side, the additional analysis reveals a meaningful nonlinear pattern. The knot-free wave contrasts establish it without fitting any curve: the hourly-wage coefficient is less negative in 2018 than in 2010 by +0.127 (.021) log points and in 2021 by +0.197 (<.001), with no further gain from 2021 to 2023 (−0.082 (.383)). The exploratory spline with a knot around 2010–11 traces the same path: the penalty deepened from a 2006 level of −0.436 at −0.0244 (<.001) log points per year to its trough, then attenuated at +0.0093 (.011) log points per year. The reason the main text's linear test reports "no change" is now visible: a single linear slope over the whole window is +0.0002 (.920)—essentially zero—because it averages a significant deepening against a significant recovery (Figure S3A). The inverse-variance meta-regression on the eleven published coefficients agrees (pre-2011 slope −0.029 (.017); change at 2011 +0.041, p = 0.015).

The same V appears in annual earnings—the leg of the decomposition that never divides by hours and therefore cannot be a division artifact: +0.140 (.005) from 2010 to 2018 and +0.197 (<.001) from 2010 to 2021 in the wave contrasts, and a post-2011 slope of +0.0129 (<.001) per year in the spline. Under stress testing, however, the two legs part company, and the difference should be stated exactly. The annual-earnings recovery is robust: it survives excluding 2021 (+0.0109 (.005) per year) and a 2010-knot series ending in 2018 (+0.0125 (.019)). The hourly attenuation, by contrast, becomes smaller and statistically insignificant once 2021 is excluded (+0.0064 (.191) per year, p = 0.191) or the series ends in 2018 (+0.0069 (.180); Figure S3B).

Two limits keep this from becoming an elitization story. First, magnitude: the hourly penalty recovered only from about −0.60 at the 2010–11 trough to about −0.45 in 2023—still roughly a 36 percent shortfall per hour, and still negative and significant (p < .001) in every one of the eleven waves. No wave, and no segment, reaches a positive hourly return. Second, what the data rule out is a stable or persistent annual-earnings premium, not a positive reading in every wave: the pooled coefficient is a bounded zero (−0.0001; 95 percent confidence interval ±0.023), while the wave-specific coefficients scatter on both sides of zero—2021 shows +0.108 (p = .002, roughly an 11 percent differential), which reverts to an insignificant +0.042 in 2023. The resulting interpretation is a partial reduction in a still-substantial penalty, and a wage consequence of overwork that remains categorically different from the repriced, premium-bearing overwork observed in parts of the contemporary United States.

Table S5: The overwork wage penalty, piecewise-linear specification (knot at 2011). Coefficients in log points; standard errors in parentheses.

Outcome and sample	(1) 2006 level	(2) 2006–11 slope	(3) Change at 2011	(4) 2011–23 slope	(5) Single linear
Hourly wage, all waves	-0.436†	-0.024†	+0.034†	+0.009*	+0.000
	(0.028)	(0.007)	(0.009)	(0.004)	(0.002)
Hourly wage, excl. 2021	-0.437†	-0.023†	+0.029†	+0.006	-0.002
	(0.028)	(0.007)	(0.011)	(0.005)	(0.003)
Annual earnings, all waves	+0.046*	-0.022†	+0.034†	+0.013†	+0.004
	(0.020)	(0.006)	(0.008)	(0.003)	(0.002)
Annual earnings, excl. 2021	+0.046*	-0.021†	+0.032†	+0.011†	+0.001
	(0.020)	(0.006)	(0.009)	(0.004)	(0.003)

Notes: Weighted least squares among employees on log hourly wage and, separately, log annual earnings, with wave dummies, class, the full covariate set, and province fixed effects; province-clustered standard errors. The "2006 level" is the overwork coefficient at baseline; the two slopes and the change are the overwork-by-time interactions of the spline; the "single linear" column is the one-slope trend estimated on the same sample and shows why the linear test reads as flat. A meta-regression on the eleven by-wave hourly coefficients gives a pre-2011 slope of -0.029 (0.017) and a change at 2011 of +0.041 (p = 0.01). Because the knot is placed after inspecting the trajectory, this spline is exploratory; companion knot-free wave contrasts and 2010-knot splines ending in 2018 or 2021 (Section S3.4) yield the same asymmetric pattern. Standard errors are in parentheses below coefficients. *p < 0.05; †p < 0.01 (two-tailed).

On the U.S. overwork premium

The article interprets the comparison with U.S. evidence conservatively. Cha and Weeden (2014) estimate an average hourly return to overwork that rose across 1979–2009 and crossed from negative to positive; it was neither instantaneous nor uniform. The premium is heterogeneous across occupations (Weeden, Cha, and Bucca 2016) and concentrated in salaried, professional and managerial labor markets; in other segments and in earlier years, long hours in the United States carried little premium or none. The comparison the paper draws should therefore be stated as a contrast between China's persistent penalty and the U.S. tendency, over three decades, for overwork to

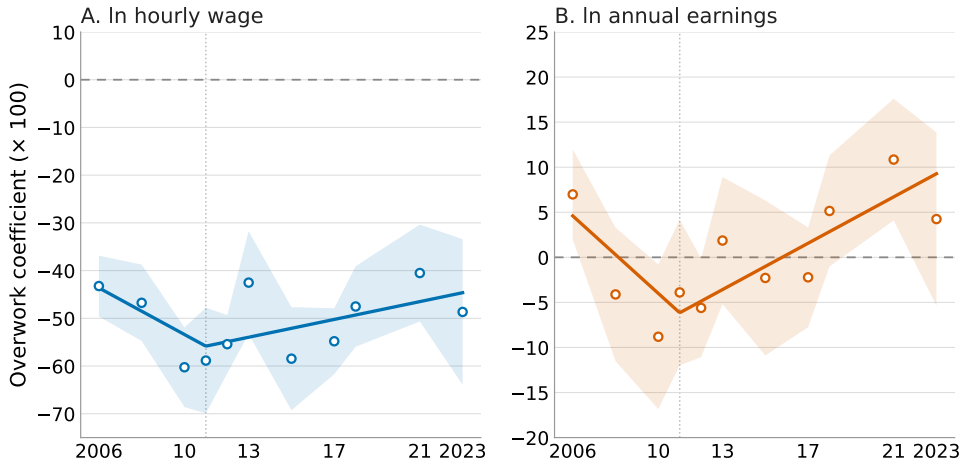

Figure S3: The overwork coe icient on log hourly wage (Panel A) and log annual earnings (Panel B), with piecewise-linear fits (knot at 2011, dotted). Both deepen to a 2010–11 trough and then attenuate. The hourly-wage coefficient remains negative throughout; annual-earnings coefficients cross zero in some waves, but no stable premium emerges. Bands are 95 percent confidence intervals on the by-wave coe icients.

become repriced in elite segments—not as a claim that every American worker is paid a premium for long hours.