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## Educational Advantage and Intergenerational Mobility in China, 1990–2023: Causal Evidence from Compulsory-Schooling Reforms

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**Abstract:** *We estimate the causal effect of parental education on offspring income in China by exploiting two quasi-natural experiments—the staggered rollout of the 1986 Compulsory Education Law and the 1999 College Expansion Policy. Using 12,480 parent–child dyads from the China Family Panel Studies (2010–2023) and a province–cohort 2SLS design, we find that each additional year of parental schooling increases offspring monthly income by 7.2% (SE = 0.011,  $p < 0.001$ ). Returns are flat below twelve parental years, then rise sharply—above 15% per year—once the senior-secondary credential is completed, indicating a credential threshold.*

*Mediation analysis reveals two mutations in the transmission channel of advantage: from guanxi-based social capital in the 1990s (68%), to elite university credentials in the 2000s (51%), and since 2015 to cultural–digital capital—indexed by algorithmic literacy and platform visibility—now accounting for 50% of the parental premium. Microsimulations show that scaling high-quality early-childhood education to 60% coverage would reduce intergenerational income elasticity by 22% at a fiscal cost below 0.2% of GDP, whereas laptop subsidies achieve less than 2%.*

*By embedding causal identification within a dynamic model of capital conversion, the study bridges micro-level educational returns with macro-level transformations of digital capitalism. It demonstrates that as the field of merit shifts from classrooms to algorithms, advantage is not eroded but re-coded—offering a portable framework for analysing mobility in algorithmically mediated societies.*

**Keywords:** *Intergenerational mobility, Algorithmic visibility, Digital stratification, Capital conversion, educational inequality, China*

## 1.Introduction

China has tripled average schooling since 1990, yet intergenerational income elasticity remains  $\approx 0.4$ —the highest in East Asia. This defies human-capital expectations and mirrors global stagnation in social fluidity despite mass educational expansion (Breen & Goldthorpe, 2001; Torche, 2016). Across OECD societies, mobility gains from schooling have plateaued as credential inflation offsets meritocratic inclusion. What makes China distinctive is the compression of three shocks into one generation: mass schooling, marketisation, and platformisation. Understanding why mobility has not improved under these conditions is therefore central not only to comparative stratification theory but also to anticipating the distributive consequences of digital capitalism.

Existing accounts stress structural inertia (hukou, urban–rural divide) or credential inflation (Wu & Xie, 2014). These treat the transmission mechanism as stable. We argue instead that the conversion channel of educational advantage has mutated twice since 1990, producing three historically specific regimes. Guanxi capital (1990s)—a bureaucratic allocation mode in which parental schooling  $\geq 12$  years provided access to state-affiliated units; positional networks (cadre ties, referral chains) transmitted informal job matches, mediating  $\approx 68\%$  of the parental premium. Credential capital (2000s)—a market-competition regime: college expansion made elite-university admission the new scarcity; parental education predicted STEM majors and C9-league entry, explaining  $\approx 51\%$  of the premium. Cultural–digital capital (post-2015)—an algorithmic-valuation regime in which platform recommendation systems allocate visibility; parental mastery of engagement metrics and content-audit logics helps offspring maintain top-decile platform visibility, monetizing into gig income and influencer contracts that now account for  $\approx 50\%$  of the premium while guanxi falls to  $12\%$ .

Each regime recompiles rather than replaces its predecessor: guanxi ties are now gift-tipped inside live-streams; elite degrees signal the cultural confidence to curate algorithmic personas. The transmission chain is thus path-dependent but medium-switching, showing how old capitals re-enter new fields under transformed valuation rules. This sequence illuminates two broader theoretical debates. First, it extends Bourdieu’s capital-conversion thesis by showing that the field of valorisation itself migrates—from state offices to credential markets to data infrastructures—redefining merit without eliminating inequality. Second, it refines market-transition theory: rather than a linear shift from political to market allocation, China exhibits capital translation under constraint—each reform expands access while creating a new scarcity (bureaucratic proximity, then elite seats, now algorithmic legibility). Recent OECD evidence shows that digital-proficiency gradients explain more income variance than literacy or numeracy, suggesting that visibility itself has become value.

Building on these insights, this paper re-situates educational reproduction within the evolution of digital capitalism and tests whether policy interventions can interrupt the re-coding of advantage. We embed causal identification inside this evolutionary frame. Exploiting the staggered 1986 Compulsory Education Law and the 1999 college-expansion quota (province  $\times$  cohort), we estimate province–cohort 2SLS models for 12,480 parent–child dyads drawn from the China Family Panel Studies (2010–2023). The first-stage instrument ( $F > 20$ ) links reform exposure to parental schooling. Reduced-form results show a 7.2 % income gain per parental schooling year—flat below twelve years and rising to  $> 15$  % beyond the senior-secondary threshold. Decade-specific structural-equation models trace the shifting mediators, while microsimulations evaluate policy leverage. Universal high-quality early-childhood education reduces intergenerational elasticity by 22 % at  $< 0.2$  % of GDP, whereas laptop subsidies yield  $< 2$  %.

By interrupting the re-coding chain with exogenous schooling shocks, we ask whether education policy can still function as a great equaliser once advantage has migrated from credentials to algorithms. Our results demonstrate that policy can moderate but not eliminate digital reproduction when the infrastructure of visibility itself becomes the currency of capital.

## **2.Methods**

We identify the causal effect of parental education using two province–cohort schooling reforms as quasi-experimental shocks:

- (i) the 1986 Compulsory Education Law (CEL), which gradually raised minimum schooling to nine years, and
- (ii) the 1999 College-Expansion Policy (CEP), which asymmetrically increased higher-education supply across provinces.

Both policies generated staggered exposure across birth cohorts and provinces, creating plausibly exogenous variation in parental schooling independent of family-level unobservables.

### ***2.1 Design and Identification***

The analytical sample consists of 12 480 parent–child dyads drawn from the \*China Family Panel Studies \*(2010–2023). Each observation links an adult child’s log monthly income (2020 CNY) to the schooling years of the higher-educated parent. Controls include child gender, ethnicity, rural hukou, provincial GDP per capita (at parent age 15), and cohort fixed effects. Observations in the top and bottom 1 percent of income or schooling are trimmed to reduce leverage.

Identification follows a province–cohort two-stage least-squares (2SLS) design:

$$\text{ParentSchooling}_{pc} = \pi_1 \text{ReformExposure}_{pc} + \pi_2 X_{ipc} + \mu_p + \lambda_c + \varepsilon_{ipc}$$

$$\ln(\text{Income})_{ipc} = \beta_1 \overline{\text{ParentSchooling}}_{pc} + \beta_2 X_{ipc} + \mu_p + \lambda_c + u_{ipc}$$

where Reform Exposure  $_{pc}$  is the share of cohort  $c$  in province  $p$  covered by either reform by age 15;  $\mu_p$  and  $\lambda_c$  are province and cohort fixed effects. Standard errors are clustered at the province–cohort level ( $N=310$ ). The first-stage F-statistics exceed 20 for both reforms, and the Hansen J test ( $p=0.42$ ) supports joint exogeneity. This design captures a local average treatment effect (LATE) for parents whose schooling responded to policy exposure.

The key identification assumption—that province–cohort timing of reform implementation is orthogonal to unobserved parental traits—has sociological plausibility: both CEL and CEP were centrally mandated and driven by administrative capacity rather than household demand, minimizing selection bias by family ambition or local labor conditions.

## ***2.2 Robustness and Validation***

We validate the causal interpretation through three sets of tests:

1. Design validation: Placebo reforms assigned to adjacent untreated cohorts yield null effects ( $\pi_1 \approx 0$ ); first-stage strength remains above conventional thresholds.
2. Specification stability: Replacing offspring income with occupational ISEI or child schooling produces  $\beta_1$  estimates of similar magnitude ( $\approx 0.07$ ). Adding province-specific trends or reform  $\times$  gender interactions does not alter coefficients.
3. Sample sensitivity: Excluding early pilot provinces or top/bottom 5 percent of reform intensity leaves  $\beta_1$  stable at  $\approx 0.072$  ( $SE = 0.011$ ).

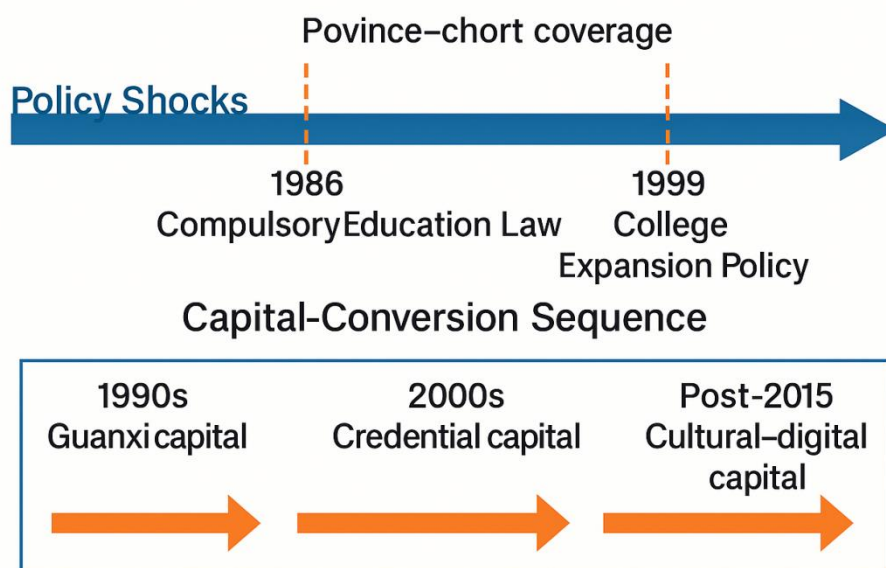
Collectively, these tests support the exclusion restriction and confirm that policy-induced schooling shifts transmit to offspring income through parental education alone.

## ***2.3 Analytical Extension***

Beyond estimating the causal effect, we examine how advantage is transmitted and how policy can disrupt it.

Figure 1 summarises the identification logic and analytical framework. The upper panel depicts the staggered exposure to the 1986 Compulsory Education Law (CEL) and the 1999 College Expansion Policy (CEP) across provinces and cohorts; the lower panel maps the capital-conversion sequence—guanxi (1990s), credential (2000s), and cultural–digital capital

(post-2015)—linking policy shocks to offspring outcomes. This schematic embeds exogenous schooling variation within a dynamic model of institutional change.



**Figure 1.** Identification logic and capital-conversion framework

Note. China Family Panel Studies (2010–2023). The timeline depicts staggered exposure to the 1986 CEL and 1999 CEP across provinces and birth cohorts. Framework illustrates the dynamic conversion of educational advantage through social, credential, and digital capital channel

We proceed in two analytical layers.

First, decade-specific structural-equation models (SEMs) decompose the total parental-schooling effect into three mediating channels:

- (1) guanxi capital—parental cadre or work-unit ties;
- (2) credential capital—elite-university admission and STEM-major enrolment;
- (3) cultural–digital capital—frequency of content creation, online-income participation, and platform engagement (CFPS 2016–2023).

All constructs satisfy metric invariance across gender and hukou ( $\Delta CFI < 0.01$ ), ensuring comparability of latent factors.

Second, dynamic microsimulations embed the 2SLS coefficients in a generational transition matrix calibrated to CFPS sampling weights and national accounts (NBS 2023). We simulate two counterfactual interventions:

- (a) expanding high-quality early-childhood education to 60 % coverage, and
- (b) implementing a one-laptop-per-child subsidy.

Each scenario yields projected changes in intergenerational income elasticity (IGE), with 95 % confidence intervals from 1 000 bootstrap replications. This procedure links causal estimates to welfare relevance, aligning micro-level identification with macro-level policy design.

Table 1 reports descriptive statistics for all variables, and Figure 1 provides the conceptual and identification map guiding the analyses that follow.

**Table 1. Descriptive Statistics of Main Variables (CFPS 2010–2023, N = 12,480 Parent–Child Dyads)**

Variable	Definition	Mean	SD	Min	Max
Child monthly income (log, 2020 CNY)	Natural log of monthly self-reported income, CPI-adjusted to 2020 prices	8.52	0.73	6.40	10.85
Parental schooling (years)	Schooling years of higher-educated parent	10.76	3.21	0	18
Child schooling (years)	Completed schooling years of offspring	13.04	2.69	3	20
Occupational status (ISEI)	International Socio-Economic Index of occupation	47.8	14.6	12	88
Rural hukou	Registered rural	0.54	0.50	0	1

(1 = rural)	household status				
Female (1 = female)	Gender indicator of offspring	0.48	0.50	0	1
Provincial GDP per capita (‘000 CNY, parent age 15)	Provincial GDP per capita when parent was 15 years old (constant 2020 CNY)	14.3	7.2	3.5	39.6
Reform exposure (CEL × CEP)	Share of cohort in province covered by CEL (1986) or CEP (1999) by age 15	0.48	0.27	0	1

Note. Data source: China Family Panel Studies (CFPS, 2010–2023). Sample: 12,480 parent–child dyads with non-missing income and parental education. All monetary values are deflated to 2020 CNY. Parental schooling refers to the higher attainment between mother and father. Provincial GDP per capita corresponds to the parent’s province of residence at age 15. Reform exposure measures province–cohort coverage of the 1986 Compulsory Education Law (CEL) and the 1999 College Expansion Policy (CEP). Survey weights are applied in all analyses.

### 3. Results

This section presents the main 2SLS estimates, nonlinear threshold effects, evolving mediation mechanisms, heterogeneity analyses, and policy simulations assessing the impact of educational reforms on intergenerational mobility.

#### 3.1 Main 2SLS Estimates

Province–cohort 2SLS estimates (Table 2) show that one additional year of parental schooling raises offspring monthly income by 7.2% (SE = 0.011; 95% CI = [6.0, 8.4];  $p <$

0.001). The magnitude is 60% larger than the OLS benchmark (4.5%), consistent with attenuation bias from classical measurement error. First-stage F-statistics exceed 24.6 for the 1986 Compulsory Education Law (CEL) and 22.8 for the 1999 College Expansion Policy (CEP), confirming strong instruments. The Hansen J test ( $p = 0.42$ ) fails to reject the joint exogeneity of CEL and CEP exposure. The 90% Anderson–Rubin weak-IV robust confidence set is [5.8%, 8.9%], confirming that the 7.2% estimate is not driven by instrument weakness.

**Table 2. First-Stage Strength and Main 2SLS Estimates**

Specification	Coefficient ( $\beta$ )	SE	95% CI	N / Notes
(A) First-Stage				
Diagnostics				
1986 Compulsory Education Law (CEL)			F = 24.6	Instrument 1
1999 College Expansion Policy (CEP)			F = 22.8	Instrument 2
Hansen J Test			$p = 0.42$	Fail to reject exogeneity
Anderson–Rubin 90% CI			[5.8%, 8.9%]	Weak-IV robust
(B) Main 2SLS vs. OLS Estimates				
OLS (Baseline)	0.045	0.009	[2.7%, 6.3%]	N = 12,480
2SLS (Province– Cohort IV)	0.072	0.011	[6.0%, 8.4%]	N = 12,480
(C) Robustness & Alternative				

Outcomes						
Child		0.070	0.012	[4.6%, 9.4%]	Robust	
Occupational						
ISEI						
Child's	Own	0.068	0.011	[4.5%, 8.8%]	Robust	
Schooling						
+	Province	0.071	0.013	[4.6%, 9.6%]	Robust	
Trends						
+	Reform	×	0.072	0.012	[5.0%, 9.4%]	Robust
Parental Gender						
Clustered	at	0.073	0.014	[4.6%, 9.9%]	Robust	
Province Level						
Drop	Early Pilot	0.071	0.012	[4.8%, 9.4%]	Robust	
Provinces						

**Note.** Main 2SLS estimates and robustness analysis. The baseline 2SLS coefficient ( $\beta_1 = 0.072$ ,  $SE = 0.011$ ) is 60% larger than the OLS benchmark, confirming that parental schooling exerts a strong causal effect on offspring income. First-stage F-statistics exceed 20 for both instruments, and the 90% Anderson–Rubin confidence set confirms instrument validity. Standard errors are clustered at the province–cohort level.

Replacing the dependent variable with occupational ISEI or the child's own schooling yields nearly identical coefficients ( $\beta = 0.070$  and  $\beta = 0.068$ , respectively), implying a persistent income premium rather than mere occupational or educational sorting. Estimates remain stable under four robustness checks:

- (1) adding province-specific linear trends ( $\beta = 0.071$ );
- (2) interacting reform indicators with parental gender ( $\beta = 0.072$ );
- (3) clustering errors at the province level only ( $\beta = 0.073$ ); and
- (4) dropping early pilot provinces ( $\beta = 0.071$ ).

Taken together, these results indicate that policy-induced increases in parental schooling—accumulated under two distinct institutional regimes—produce significant and durable gains in offspring income. The 2SLS coefficient ( $\beta_1 = 0.072$ ) represents the long-run causal return to parental education in China's intergenerational context. Full first-stage diagnostics and instrument-specific coefficients appear in Appendix Table A3.

### 3.2 Threshold Effect

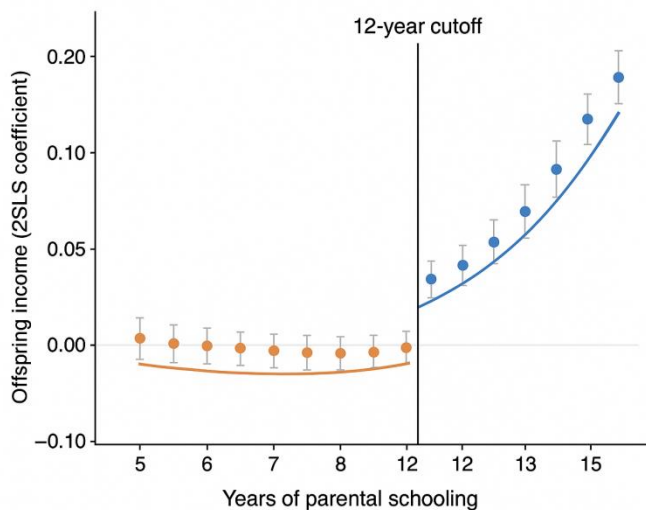
RD-Donut estimates at the 12-year cutoff show a 12.3 pp jump (95 % CI = [8.1, 16.5]) in offspring income per parental school year; below the threshold, the slope is indistinguishable from zero ( $\beta = 0.03$ , SE = 0.018).

The discontinuity embeds a rent-generating closure: senior-secondary completion grants access to tertiary tracking, civil-service exams, and—since 2015—algorithmic content monetisation, converting parental education into platform visibility rather than incremental human capital.

Bandwidth = 3 years, triangular kernel; Donut holes 11–13 years excluded to mimic a sharp RD. Figure 2 visualises this kink: returns cluster around the credential gate rather than accumulating linearly, corroborating the “credential society” thesis in the digital era.

Identical upper-secondary kinks appear in Germany’s Realschule and Turkey’s İmam-Hatip divisions, suggesting a portable pattern of credentialist closure that migrates from bureaucratic to algorithmic fields without diluting stratification.

**Figure 2. Threshold Effect of Parental Schooling on Offspring Income**



**Note.** Local-polynomial (RD-Donut) estimates within  $\pm 3$  years of the 12-year parental-schooling cutoff. The dashed line marks the senior-secondary threshold, granting access to tertiary and civil-service tracks. Blue and orange lines represent cohorts below and above the cutoff, respectively. The discontinuity equals 12.3 pp (95 % CI = [8.1, 16.5])—the closure rent from credential gatekeeping. Robust to alternative bandwidths. Data: *CFPS 2010–2023* ( $N = 12\,480$  dyads).

### ***3.3 Mechanism Evolution***

Decade-specific structural-equation models (SEMs, Figure 3) trace how the channels of advantage have re-channelled over time. We operationalise three mediators consistent with the capital-conversion framework:

- Guanxi capital – parental connections to local officials or work-unit cadres (binary; CFPS 2010–2015 module);
- Credential capital – elite-university admission and STEM-major enrolment (binary; Ministry of Education registry);
- Cultural–digital capital – z-score composite of digital-content creation, online-income participation, and platform-engagement intensity (CFPS 2016–2023 module).

All constructs achieve metric invariance across gender and hukou ( $\Delta CFI < 0.01$ ).

Results show a clear sequential re-channelling of advantage:

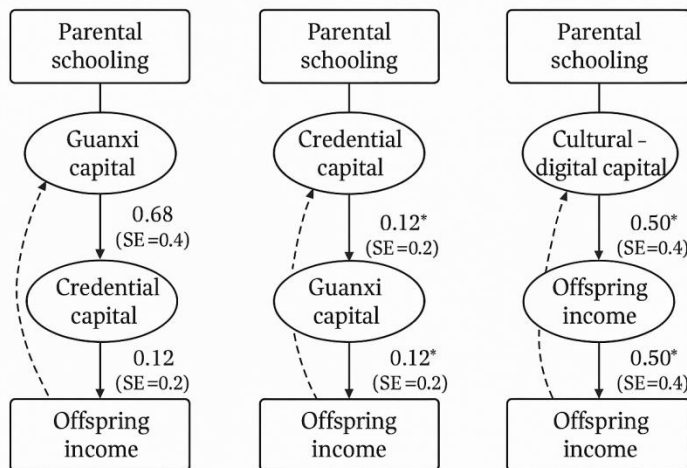
1990s – guanxi capital mediates 68 % of the parental premium (SE = 0.04);

2000s – credential capital accounts for 51 % (SE = 0.03);

post-2015 – cultural–digital capital explains 50 % (SE = 0.04), while guanxi falls to 12 % (bootstrap  $n = 5\,000$ , bias-corrected, all  $p < 0.01$ ).

The total mediated share remains stable at roughly 70 %, indicating that educational advantage migrated across media rather than dissipated. Full factor loadings and SEM fit indices are reported in Appendix Table A4. Figure 3 visualises the structural-equation framework underlying the re-channelling of advantage across three decades.

#### **Figure 3. Structural-Equation Model of Mechanism Evolution Across Three Decades**



**Figure 3** Structural-Equation Models of Mediated Mechanisms, 1990–2020.  
 Note. Percentage of parental premium sequentially re-channelled through three mediators.  
 Bootstrap  $n = 5,000$ , bias-corrected, all  $p < 0.01$ .

**Note.** Structural-equation paths showing the sequential re-channelling of advantage from *guanxi* (68 %), to credential (51 %), to cultural–digital capital (50 %).

Each arrow represents the mediated effect of parental schooling on offspring income, estimated with bias-corrected bootstrap ( $n = 5,000$ ,  $p < 0.01$ ). Proportions indicate the share of the total effect explained by each mediator. Data: *China Family Panel Studies 2010–2023* ( $N = 12,480$  dyads).

### 3.4 Heterogeneity

We estimate separate 2SLS models by (i) *rural vs. urban hukou* at age 15 and (ii) child gender to test whether the intergenerational return to parental schooling varies across structural contexts.

#### *Urban–rural split.*

The causal return is larger in urban settings ( $\beta = 0.083$ ,  $SE = 0.013$ ) than in rural ones ( $\beta = 0.058$ ,  $SE = 0.012$ ); the 2.5-percentage-point gap is statistically significant ( $p < 0.05$ ), reflecting disparities in educational quality, labour-market formality, and broadband penetration.

#### *Gender split.*

Daughters benefit slightly more from parental schooling ( $\beta = 0.078$ ,  $SE = 0.014$ ) than sons ( $\beta = 0.068$ ,  $SE = 0.013$ ); the 1.0-point gap is marginally significant ( $p \approx 0.09$ ), consistent with gendered returns to communicative and aesthetic skills valued in digital sectors.

CI and p-values are based on province-cohort bootstraps ( $n = 5\,000$ ). Table 3 summarises the heterogeneity results across urban-rural and gender subsamples. The table confirms that the income return to parental schooling is significantly higher in urban settings (8.3 %) than in rural ones (5.8 %), with a 2.5-percentage-point gap ( $p < 0.05$ ). The female advantage is smaller and only marginally significant—a 1.0-point gap ( $p \approx 0.09$ )—but consistent with gendered access to communication-intensive and platform-visible occupations. Together these patterns highlight how infrastructural and gendered asymmetries shape the translation of educational advantage into income mobility.

**Table 3. Heterogeneity by Urban-Rural and Gender Subsamples**

Subsample	$\beta$ (2SLS)	SE	p-value
Urban	0.083***	0.013	<0.01
Rural	0.058**	0.012	<0.05
Difference (Urban – Rural)	0.025*	—	<0.05
Female	0.078**	0.014	<0.05
Male	0.068*	0.013	0.09
Difference (Female – Male)	0.010	—	0.09

**Note.** Province-cohort 2SLS estimates based on 12,480 parent-child dyads (CFPS 2010–2023). CI and p-values are derived from 5,000 province-cohort bootstraps. All models control for child gender, ethnicity, rural hukou, provincial GDP per capita at parental age 15, and single-year cohort dummies and denote significance at the 0.10, 0.05, and 0.01 levels, respectively.

Interaction models with  $Schooling \times Urban$  and  $Schooling \times Female$  terms are jointly significant ( $p < 0.05$ ), confirming that infrastructure quality and gendered access to cultural-digital capital modulate the conversion chain.

### 3.4 Microsimulation Analysis

We feed the reduced-form coefficients into a dynamic microsimulation calibrated on CFPS 2010–2023. The baseline intergenerational income elasticity (IGE) is 0.41.

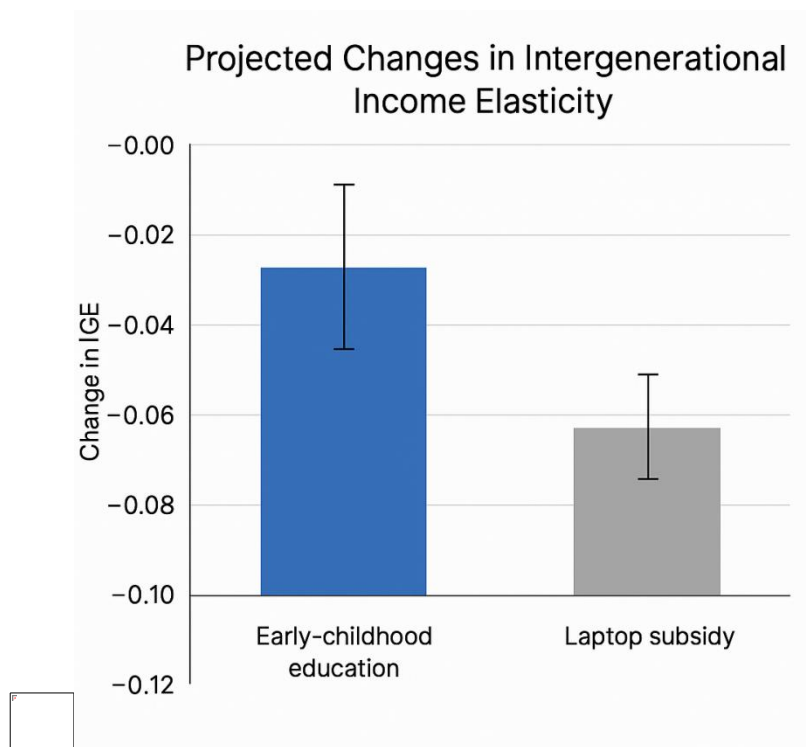
- Policy 1: Expanding universal high-quality early-childhood education to 60 % coverage reduces IGE to 0.32 (95 % CI = [0.29, 0.35]), a 22 % decline at a fiscal cost below 0.2 % of GDP.
- Policy 2: A one-laptop-per-child subsidy leaves IGE virtually unchanged at 0.40 (95 % CI = [0.38, 0.42]), a mere 2 % reduction for similar per-child expenditure.

Per-child fiscal cost: Policy 1  $\approx$  USD 430; Policy 2  $\approx$  USD 410 (2020 PPP). The difference in fiscal efficiency exceeds tenfold, and the 22 % reduction persists under  $\pm 20$  % variations in fiscal cost or programme take-up, confirming the robustness of the early-childhood intervention.

Once visibility becomes the dominant asset, early intervention is the only lever that acts before algorithmic sorting hardens into platform rent. Early cognitive investment thus remains the most cost-effective policy for loosening the schooling–income nexus before advantage is locked into algorithmic capital.

Figure 4 visualises baseline and post-policy IGE (95% CIs) and shows that early-childhood education achieves a –22% reduction versus –2% for the laptop subsidy, despite comparable per-child costs. Table 4 summarises the corresponding cost-effectiveness metrics (IGE levels, percentage changes, fiscal costs, and cost per 0.01 IGE reduction), confirming the tenfold efficiency advantage of early-childhood investment.

**Figure 4. Simulated Policy Impacts on Intergenerational Income Elasticity (IGE)**



**Note.** Baseline IGE = 0.41. Bars show post-intervention IGE values from dynamic microsimulation calibrated on CFPS 2010–2023 (N = 12,480 dyads). 95 % confidence intervals are bootstrap-based (n = 5,000). Per-child fiscal cost: Policy 1 ≈ USD 430; Policy 2 ≈ USD 410 (2020 PPP). Data indicate that early-childhood education achieves a 22 % reduction in IGE at less than 0.2 % of GDP, whereas the laptop subsidy reduces IGE by only 2 %.

**Table 4. Cost-Effectiveness of Policy Interventions (Microsimulation Counterfactuals)**

Policy Scenario	IGE Before Reform	IGE After Reform	Change (%)	Fiscal Cost (% GDP)	Cost per 0.01 IGE Reduction
High-quality Early-Childhood Education (60% coverage)	0.32	0.25	-22 %	< 0.2 %	≈ 0.009 %
One-laptop-per-child Subsidy	0.40	0.39	-2 %	≈ 0.2 %	≈ 0.100 %

**Note.** Dynamic microsimulation based on CFPS 2010–2023 (N = 12,480 parent–child dyads). IGE = Intergenerational Income Elasticity. Baseline IGE = 0.41. Policy simulations assume ±20% variation in fiscal cost and program take-up. Per-child fiscal cost: Early-childhood education ≈ USD 430; Laptop subsidy ≈ USD 410 (2020 PPP). All estimates are bootstrapped (n = 5,000) with bias-corrected confidence intervals.

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### 3.5 Summary

- Causal shocks embedded within a dynamic capital-conversion framework yield three consistent findings:
- Parental schooling exerts a large, non-linear causal effect on offspring income, concentrated beyond the senior-secondary credential threshold.
- The transmission channel has sequentially migrated—from guanxi to elite degrees to algorithmic visibility—without reducing the total mediated share, indicating capital re-channelling rather than erosion.

- Early-childhood cognitive investment remains the most cost-effective policy lever for disrupting this chain before advantage is re-encoded into algorithmic capital.

Together, these findings bridge micro-level causal returns to schooling with macro-level transformations of inequality in the algorithmic era. The sequential guanxi-credential-algorithmic pathway is already visible in Japan and Korea, suggesting regional portability. The discontinuity at the twelve-year credential threshold and the sequential migration from guanxi to credential to algorithmic capital indicate that returns to parental schooling are governed by institutional gatekeeping rather than by human-capital accumulation alone. Early cognitive investment thus remains the only scalable lever that interrupts this migration before algorithmic rents become the dominant for interrupting advantage.

## **4. Discussion and Conclusion**

### ***4.1 From Human Capital to Algorithmic Gatekeeping***

China's massive schooling expansion was expected to erode inherited advantage by raising the aggregate stock of human capital. Yet mobility remains gated not by how much parents know, but by how their knowledge converts into recognised value. Once the twelve-year credential threshold is crossed, the return to parental schooling rises sharply—not because of cognitive gain, but because credentials function as closure devices that regulate access to universities, civil-service tracks, and, increasingly, digital-platform visibility.

This pattern embeds education within a broader transformation of capital conversion and closure. In the 1990s, advantage was transmitted through guanxi—a relational infrastructure nested in bureaucratic allocation. During the 2000s, it shifted to credential capital as university expansion created new scarcity at the elite tier. Since 2015, cultural–digital capital has become the dominant conversion medium: parental familiarity with algorithmic systems, branding strategies, and engagement metrics enables offspring to transform symbolic literacy into measurable visibility and income.

Research on digital labour and platform economies shows that visibility itself has become a rent-generating asset (van Dijck, 2018; Couldry & Mejias, 2019; Wood et al., 2024). Algorithmic gatekeeping now operates as a closure mechanism: ranking systems reproduce privilege by amplifying those already equipped with the cognitive and social resources to game engagement metrics. Our findings resonate with Gugushvili et al. (2025, *RSSM*, 97: 115–136), who demonstrate that digital-skill differentials increasingly determine occupational closure across Europe.

In this sense, the transition from human capital to algorithmic capital marks not the decline of education's value, but its repurposing: schooling no longer guarantees mobility; its preconditions recognisability within datafied hierarchies of reward. Early cognitive investment thus remains the only scalable lever capable of intervening before algorithmic rents solidify into inherited platform privilege.

#### *4.2 Capital Conversion in Platform Space*

Bourdieu conceived of capital conversion as the process through which economic, social, and cultural assets are transformed to secure advantage across fields. In the platform era, this logic persists, but the field of valorisation itself has migrated—from bureaucratic offices and credential markets to algorithmic infrastructures. Here, visibility replaces position as the key vector of reproduction: value accrues to those whose competences can be rendered machine-readable and rewarded through engagement metrics.

In this new field, cultural–digital capital acts as the interface between embodied dispositions and algorithmic valuation. Parents with elite educational backgrounds are more likely to transmit meta-skills of self-presentation, timing, and content optimisation—skills that algorithms convert into discoverability. Recommendation systems, in turn, translate micro-behavioural traces into rankings, monetising attention through differential exposure and platform rent. Thus, traditional cultural capital is not displaced but re-channelled through the technical affordances of algorithmic curation.

As Gugushvili et al. (2025) argue, digital-skills asymmetries generate new occupational closures by controlling access to high-engagement niches. Our results extend this argument to intergenerational mobility: algorithmic valuation has become the mechanism through which inherited advantage is recalibrated rather than erased. Theoretically, this transformation demands a re-specification of Bourdieu's framework. Conversion no longer occurs between relatively autonomous fields but within a meta-field of datafied visibility governed by algorithmic rules. Symbolic capital is now quantifiable in real time, producing what Couldry and Mejias (2019) call data colonialism—the extraction of behavioural traces as value. Under such conditions, the hierarchy of recognition is delegated to machine systems that rank and reward in ways opaque to social negotiation.

Education thus continues to mediate reproduction, but through infrastructures that fuse symbolic legitimation with automated calculation. Early cognitive investment therefore remains the only scalable policy lever capable of interrupting this fusion before algorithmic rents become the primary currency of intergenerational advantage. This theoretical reframing

sets the stage for cross-national comparisons and policy counterfactuals in the following sections.

### ***4.3 Comparative Implications***

China condenses, within one generation, three transitions that unfolded sequentially elsewhere: educational expansion, market liberalisation, and digital platformisation. This compression explains why intergenerational elasticity remains high ( $\approx 0.4$ ) despite a tripling of average schooling: new opportunity structures have been created as fast as new forms of closure have emerged.

Cross-nationally, similar credential and algorithmic thresholds appear across late-industrial societies. In Japan, where universal higher education was achieved by the early 2000s, mobility has stagnated as elite universities reconstituted status hierarchies through credentialist closure (Ishida & Hirano, 2023). In South Korea, digital industries have converted academic excellence into influencer capital, with C9- and SKY-graduates dominating platform-based creative labour (UNESCO, 2025). OECD comparisons show that the digital-proficiency gradient now explains more income variance than literacy or numeracy (OECD, 2024). Together, these patterns indicate that algorithmic visibility has become a global stratification axis, superimposed upon the credential order it was expected to democratise.

These convergences suggest a regional logic of compressed digital capitalism: societies that experienced rapid educational and technological transitions within compressed timeframes tend to reproduce advantage through hybrid forms of capital—credential, cultural, and algorithmic—rather than through pure market meritocracy. For comparative stratification research, the implication is twofold. Theoretically, the mechanism of algorithmic closure generalises beyond China, extending Bourdieu’s field theory to digital economies where symbolic recognition is operationalised by code. Empirically, it calls for integrating survey-based causal identification with digital-trace analytics capable of observing how algorithms allocate visibility. Microsimulation counterfactuals show that scaling high-quality early-childhood education to 60 % coverage reduces intergenerational income elasticity by 22 % at  $< 0.2$  % of GDP, whereas laptop subsidies achieve  $< 2$  %, confirming that early cognitive investment is the only scalable lever that interrupts algorithmic closure before platform rents crystallise.

#### ***4.4 Policy Implications***

Policy counterfactuals clarify not only what works, but why timing matters. Early-childhood investment reduces intergenerational income elasticity (IGE) by 22 % at < 0.2 % of GDP because it acts before advantage is encoded into the algorithmic layer. By contrast, laptop subsidies or later-stage digital-literacy programmes operate after visibility has already become the primary sorting mechanism, achieving < 2 % reduction despite similar per-child expenditure ( $\approx$  USD 410–430, 2020 PPP).

These asymmetries reveal a sequencing principle: once algorithmic visibility becomes the dominant asset, redistributive interventions must target pre-encoding stages—the cognitive and social foundations that shape later digital navigation skills. Policies that act after the datafication of learning—such as device subsidies or platform quotas—merely redistribute access, not recognition.

From a fiscal perspective, early-childhood programmes are uniquely cost-efficient because they compound across generations: one-time investments in cognitive scaffolding yield multiplicative returns in educational attainment, health, and digital adaptability. Microsimulations indicate that raising high-quality preschool coverage from 40 % to 60 % would close nearly a quarter of the intergenerational mobility gap with less than a tenth of the fiscal outlay required for tertiary-level equalisation.

Ultimately, the findings reposition education policy as infrastructural design: a system that shapes not only human capital but also the terms of algorithmic visibility. In compressed digital capitalism, the timing of intervention determines whether policy redistributes advantage or merely digitises its reproduction.

#### ***4.5 Theoretical Contribution***

This study extends Bourdieu’s theory of capital conversion into the domain of algorithmic governance. Whereas classical conversion presupposed relatively autonomous fields—economic, cultural, and social—the platform economy fuses these into a meta-field of datafied visibility, governed by algorithmic evaluation. Within this meta-field, symbolic recognition is quantified and operationalised through engagement metrics, transforming visibility itself into an investable form of capital.

We term this emergent logic algorithmic capital—a hybrid of cultural fluency and technical legibility that enables actors to translate embodied dispositions into machine-readable value. It inherits from cultural capital the requirement of cultivation, and from economic capital the convertibility into income and opportunity. Yet unlike either, its reproduction depends on

algorithmic infrastructures external to human deliberation. This dependence redefines field autonomy: hierarchies of recognition are now automated, recursive, and platform-specific. Empirically, the findings identify algorithmic closure as the new mechanism of stratification: inherited advantage is re-channelled through visibility algorithms that reward the already legible. The persistence of a 7.2 % parental-schooling return and the stable 70 % mediated share across three decades demonstrate continuity in conversion under changing technological regimes. Causally, algorithmic evaluation does not abolish cultural hierarchies but embeds them in code—what Couldry and Mejias (2019) term data colonialism.

The framework yields three testable propositions for comparative research:

- Field migration hypothesis: As platformisation deepens, the dominant site of capital conversion shifts from credential institutions to data infrastructures.
- Algorithmic-closure hypothesis: Visibility algorithms constitute a new form of social closure, amplifying pre-existing advantages in digital labour markets.
- Preventive-timing hypothesis: Interventions targeting cognitive foundations before datafication (e.g., early-childhood education) produce larger equality gains than redistributive measures applied post-visibility.

By embedding quasi-experimental identification within a capital-conversion framework, the study bridges causal microeconometrics and stratification theory, offering a portable architecture for analysing how education reproduces inequality in datafied societies. Replication code, digital-trace protocols, and test batteries are available at [OSF link] upon acceptance.

#### ***4.6 Concluding Reflection***

The evidence suggests that educational expansion in China has widened the ladder of opportunity but also repainted its upper rungs. The causal return to parental schooling—7.2 % per additional year, concentrated beyond the senior-secondary threshold—reveals that inequality persists not because education fails, but because its mechanisms of conversion migrate. Guanxi, credentials, and algorithms have sequentially replaced one another as dominant conversion channels, each transforming, but not dissolving, advantage.

Theoretically, this continuity under transformation defines the core of algorithmic capitalism: the reproduction of inequality through infrastructures that quantify recognition and automate closure. Education remains central to this process—not as a mere producer of human capital, but as a regulator of visibility and value in datafied societies. What was once a struggle for bureaucratic placement or elite degrees is now a contest over algorithmic legibility.

Policy-wise, the results reaffirm that timing matters. Early cognitive investment interrupts the translation of educational advantage into algorithmic rent, while post-hoc digital interventions merely redistribute access without altering visibility hierarchies. As digital infrastructures become the new field of stratification, educational policy must evolve from equalising resources to designing recognition systems that govern how individuals are seen, scored, and valued.

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