

# The Market Does Pay Off: Earnings Returns to Education in Urban China, Revisited

(A Reanalysis of Wu and Xie, ASR, June 2003)

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## Introduction and theory:

- Empirical finding: In China's transition economy, earnings returns to education are higher in the market sector than in the state sector.
- This is commonly attributed to the „more efficiently operating market mechanisms“ with respect to the realization of the value of human capital.
- Wu and Xie (2003), however, „challenge the prevailing wisdom that education is necessarily more highly rewarded in the market sector“.

## Introduction and theory:

- Wu and Xie argue that the higher returns to education observed in the market sector could be due to selection effects in the „process of sorting workers into labor markets“
- Typology of workers based on individuals' labor-market histories:
  1. „stayers“: workers who have always been employed in the state sector
  2. „early birds“: workers who transferred to the nascent market sector early and stayed there
  3. „later entrants“: workers who were initially in the state sector but later switched to the market sector
  4. „market losers“

## Introduction and theory:

- Hypothesis 1 (marketization per se): Both later entrants and early birds enjoy higher returns to education than stayers, „because all workers in the market sector are subject to the same market mechanisms“.
- Hypothesis 2 (selection effect): „Later entrants, but not early birds, enjoy higher earnings returns to education than stayers.“

Argumentation: Confounding-factors were at work in China during the economic transition

- „state firms have increased cash wages rewarding human capital in order to retain productive workers“  $\Rightarrow$  „workers with good and secure positions in the state sector would not want to voluntarily move to the market sector (...) unless the payoff is very large“
- relatively unskilled workers were „pushed to the market sector through layoffs“

## Introduction and theory:

Consequence: False impression of higher returns to education in the market sector due to unobserved heterogeneity. In particular, the observed returns to education should be higher only for later entrants and not for early birds, because this selection process was active only in the later stages of the economic transformation.

- Wu and Xie summarize:

„The crucial difference between the two hypotheses is the treatment of early birds. In Hypothesis 1, early birds are grouped with later entrants because they share the common feature of being in the market sector. (...) In Hypothesis 2, early birds are grouped with stayers because the two types of workers were approaching a convergence, against which later entrants were selectively recruited into the market sector.“

## Wu and Xie's empirical analysis:

- 1996 survey on „Life Histories and Social Change in Contemporary China“ (Donald Treiman); sample of the labor force in urban areas of China

- Model:

$$\begin{aligned}\ln(Earnings) = & \beta_0 + \beta_1 Education + \dots \\ & + \beta_6 Later entrants + \beta_7 Early birds \\ & + \beta_8 Later entrants \times Education \\ & + \beta_9 Early birds \times Education + \epsilon\end{aligned}$$

- Results:

**Table 4. OLS Coefficients from the Multiple Linear Regression of Monthly Earnings on Selected Independent Variables, Urban China, 1996: Three-Worker-Type Analysis**

Variable	Restrictive Measure		Broad Measure		Comprehensive Measure	
	Model 4a	Model 5a	Model 4b	Model 5b	Model 4c	Model 5c
Education (years of schooling)	.049*** (.009)	.045*** (.010)	.053*** (.008)	.045*** (.009)	.057*** (.007)	.047*** (.006)
Experience	.010** (.005)	.009* (.005)	.010* (.004)	.008 (.005)	.014*** (.004)	.013*** (.004)
(Experience) <sup>2</sup> × 1,000	-.153* (.074)	-.144* (.070)	-.160* (.074)	-.099 (.070)	-.203** (.070)	-0.167** (.060)
Party member (yes = 1)	.121** (.038)	.126** (.037)	.138*** (.035)	.145*** (.035)	.142*** (.037)	.149*** (.037)
Sex (male = 1)	.218*** (.040)	.213*** (.040)	.220*** (.038)	.210*** (.039)	.225*** (.038)	.216*** (.038)
Later entrants <sup>a</sup>	.312* (.144)	-.732 (.370)	.238*** (.068)	-.263 (.193)	.313*** (.071)	-.175 (.182)
Early birds	.553 (.439)	.130 (.602)	.184 (.230)	-.124 (.266)	.151 (.206)	-.067 (.249)
Later entrants × Education	—	.122* (.047)	—	.060* (.022)	—	.056** (.019)
Early birds × Education	—	.051 (.103)	—	.037 (.031)	—	.025 (.024)
Constant	5.305*** (.156)	5.348*** (.165)	5.238*** (.140)	5.333*** (.153)	5.124*** (.106)	5.230*** (.116)
Number of cases	2,072		2,061		2,060	
R <sup>2</sup>	.117	.129	.114	.123	.127	.136

*Notes:* Numbers in parentheses are standard errors adjusted for clustering on counties. Data are weighted.

<sup>a</sup> “Stayers” is the reference category; market losers are omitted from the analysis because of the small number of cases (N = 19).

\*  $p < .05$     \*\*  $p < .01$     \*\*\*  $p < .001$  (two-tailed tests)

## Wu and Xie's empirical analysis:

- Wu and Xie's conclusion: Since  $\beta_8$  turns out to be significant, but not  $\beta_9$ , Hypothesis 1 should be rejected in favor of Hypothesis 2.

„Our findings suggest that the commonly observed higher earnings and higher returns to education in the market sector compared with the state sector in China are due entirely to the earnings outcomes of later entrants. Early market entrants resemble workers in the state sector in both their level of earnings and returns to education. Thus, it appears that it is not the market per se that renders higher rewards to later market entrants. Otherwise, early birds would enjoy an advantage similar to later entrants.“

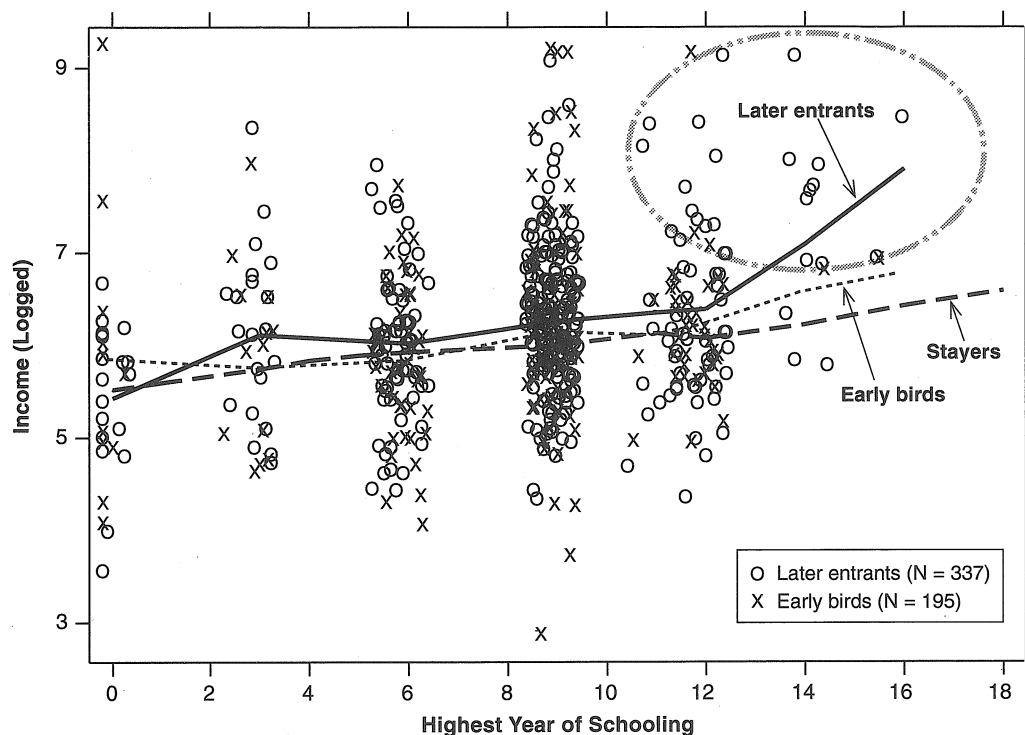


## Submission of comment to ASR:

- Wu and Xie's conclusion implies that returns to education for later entrants and for early birds are different:
  - (1) If A is different from C and
  - (2) B is not different from C, then
  - (3) A is different from B
- However: In the context of statistical testing, (3) does not follow from (1) and (2)  $\Rightarrow$  (3) should also be tested.
- Critique: As the important test of later entrants versus early birds is missing, one cannot conclude that only later entrants enjoy higher returns to education than stayers! A substantial difference between later entrants and early birds is a necessary prerequisite for being able to draw this conclusion.

## Submission of comment to ASR:

- The published coefficients and standard errors (table 3) suggest that the test is not significant (however, the covariance between the two estimators would have to be known in order to conduct the test).



## Submission of comment to ASR:

- Unfortunately, the comment was rejected by ASR.

- Review A (excerpt):

So, I conclude that the authors of this comment have identified a weakness of the Wu and Xie paper, and they should be congratulated for reading the article carefully.

But . . .

This sort of criticism could be leveled at, I suspect, 80% of all quantitatively-focused articles in ASR (and probably 95% of all quantitatively-focused articles in sociology). It is therefore quite embarrassing that Yu Xie, the recent Chair of the methodology section, would sign off on such a naïve analysis, but . . . then again . . . this seems to be the sort of simplistic analysis that gets one by a sociologist reviewer these days. That is, for years the highest payoff publication strategy has been: Put forward a very simple hypothesis about one coefficient being significant and a second simple hypothesis about another coefficient being significant. Then, run a regression model and proclaim one of the two hypotheses rejected.

- Review B (excerpt):

As for (a), there is in fact sufficient information presented in the paper to evaluate whether the coefficients are significantly different. One can compare the R-squared for models that allow the coefficients to be different for early birds and later entrants (Table 4) with models that constrain them to be the same (Table 3). Those differences can be used to construct an F-test for the significance of the difference. Such a test is not exactly correct for these tables because 19 “stayers” are deleted from Table 4, but I doubt that this would substantially alter the outcome. When I constructed this test for each of the three measures of market status, all three were highly significant, leading me to conclude that there is a real difference between the two groups.

## Submission of comment to ASR:

### ■ Response of Reviewer B to my critique of his/her review:

Ben Jann makes some valid points about my review. I had missed the fact that the main effects of entrance status were also omitted from the models in Table 3, implying that the tests I calculated were for both the main effects and the interactions. So it's possible that the low p-values could be coming from the main effects and not the interactions. The clustering on counties could also cause problems, but I doubt that would make much difference.

So the upshot is that there is not sufficient information in the article to conclude whether that the effect of education is significantly different between early entrants and later entrants. Does that mean that the comment should be accepted? It's obviously your call, but I still don't think the problems with the Wu and Xie paper are sufficiently egregious to merit a published comment.

### ■ Reply of Xiaogang Wu (excerpt):

Our alternative hypothesis states that *later entrants, but not early birds, enjoy higher earnings returns to education than stayers*. It is NOT our intention to argue that returns to education are higher for later entrants than for early birds.

## Replication of Wu and Xie's analysis:

- Data obtainable from UCLA.
- No exact replication possible. However, replication is reasonable approximation of original results.
- Result 1: As suspected, the difference in earnings returns to education between early birds and stayers is not significant.
- The Evaluation of the p-values for all differences in earnings levels and/or returns to education among the three groups indicates that a true difference between early birds and stayers is about as likely as a true difference between early birds and later entrants. Thus, Hypotheses 1 and 2 can be rejected with approximately equal likelihood.
- „Occam's razor“ gives credence to the more parsimonious Hypothesis 1  $\Rightarrow$  the market does pay off!

## Replication of Wu and Xie's analysis:

- Result 2: Inaccurate operationalization of worker types.

The typology of workers is based on the employment status 1987 and 1996. Respondents who were not active in the labor force in 1987 (18%) have been implicitly classified as belonging to the state sector in 1987. Such a procedure yields an erroneous classification of some of the respondents as stayers or later entrants.
- The difference between early birds and later entrants disappears completely, if the respondents who were not active in the labor force in 1987 are excluded:

	Model 1	Model 2	Model 3	Model 4
Education	.047*** (.006)	.048*** (.007)	.109*** (.021)	.047*** (.007)
...	...	...	...	...
Later entrants	-.175 (.182)	-.232 (.176)		-.088 (.185)
Early birds	-.067 (.249)	-.035 (.274)	.197 (.240)	-.046 (.268)
Stayers			.232 (.176)	
Later entrants×Education	.056** (.019)	.061** (.018)		.036 (.019)
Early birds×Education	.025 (.024)	.026 (.029)	-.035 (.032)	.027 (.029)
Stayers×Education			-.061** (.018)	
Constant	5.230*** (.116)	5.185*** (.111)	4.953*** (.224)	5.170*** (.136)
Number of cases	2 060	2 057	2 057	1 683
$R^2$	.136	.142	.142	.133

## Conclusions and Discussion:

- The evidence for Wu and Xie's selection hypothesis is rather weak since later entrants do not seem to be much different from early birds (especially if the misclassified cases are removed).
- Excluding the misclassified respondents does reduce the estimated earnings returns to education in the market sector. However, some evidence for higher returns to education in the market sector than in the state sector remains ( $p < 0.1$ ).
- There might be a cohort effect, but data are too sparse to clearly identify such an effect.
- Take-home message: Always test all contrasts!
- Submission of the reanalysis to ASR – Review B (excerpt):

I think this comment makes a convincing case that Wu and Xie's conclusions are unfounded. In doing so, it also provides important instruction to readers on how to avoid such errors.