

Intergenerational Educational Persistence among Daughters: Evidence from India

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Motivation

- ▶ The concerns about “equality of opportunities” are growing in developing countries (also a concern in US)
 - ▶ Education is perhaps the most important policy instrument
 - ▶ Stiglitz (2012, P. 275) notes Opportunity is shaped, more than anything else, by access to education
- ▶ Intergenerational persistence in education can undermine the notion of equality of opportunity
- ▶ Huge literature on intergenerational transmission of economic status in developed countries but predominantly focused on sons
- ▶ Only a few studies do examine intergenerational transmission between fathers and daughters (see, for example, DiPrete and Grusky 1990, Chadwick and Solon, 2002)

Motivation

- ▶ For India, Azam and Bhatt (2015) examine intergenerational transmission of education between father-son
- ▶ No study on father (mother)-daughter transmission of economic status probably because lack of suitable data
- ▶ However the issue is comparatively more important for India
 - ▶ The notion of family background (economic and caste) determining destiny is quite pervasive
 - ▶ Strong son preference in society, evidence suggests pro-male bias in educational investment (Kingdon, 2005)
 - ▶ Inequality is considerable (income gini=0.54 in 2005), and evidence suggests that countries with greater inequality of incomes also tend to be countries in which a greater fraction of economic advantage and disadvantage is passed on between parents and their children (Corak, 2013)

Objective

In this paper, I examine the father (mother)-daughter educational persistence over time in India

Data

- ▶ India Human Development Survey (IHDS)-2 collected in 2011-12 jointly by University of Maryland and National Council of Applied Economic Research.
 - ▶ 42,152 households, 204,569 individuals
- ▶ Unlike other household surveys in India, IHDS-2 has a separate women module that asks detailed questions from two women in age 15-49 per household.
- ▶ This helps us to identify fathers' (mothers') information for about 86 (88) percent of women in age 20-49.
- ▶ 38,706 (39,688) daughter-father (mother) matched observations

Methodology I

- ▶ To capture the intergenerational transmission of education, I estimate the following regression:

$$S_i^d = \alpha + \beta S_i^f + \epsilon_i \quad (1)$$

where S_i^d and S_i^f represent the education of daughter i and education of her father, respectively.

- ▶ The $\hat{\beta}$ is given by:

$$\hat{\beta} = \frac{\sigma_{df}}{\sigma_f^2} = \rho_{df} \frac{\sigma_d}{\sigma_f} \quad (2)$$

where σ_d and σ_f are the standard deviations of daughters' and fathers' schooling, while ρ_{df} is the correlation between daughters' and fathers' schooling.

- ▶ I also estimate:

$$\frac{S_i^d}{\sigma_d} = \delta + \rho \frac{S_i^f}{\sigma_f} + \epsilon_i \quad (3)$$

Methodology II

- ▶ The β by considering the ratio of variances, takes into account a change of inequality of educational outcomes in daughters and fathers generations, providing a relative measure of intergenerational mobility.
- ▶ The ρ coefficient provides an absolute measure of intergenerational transmission, i.e. cleansed from possible evolution of the distribution of educational attainments, for instance, due to school reforms that increased the average schooling of the population, reducing its variance.
- ▶ The changes in the relative standard deviations will cause both measures to evolve differently over time

Methodology III

- ▶ Following Checchi et al. (2013), I decompose the ρ

$$\rho = \sum_{d,f} \underbrace{(d - E(d))(f - E(f))}_{A} \underbrace{P(d/f)}_{B} \underbrace{P(f)}_{C} \quad (4)$$

where $d, f = 0, 1, 2, \dots, 15, 16$ and thus $\hat{\rho}$ for each cohort is the sum of 289 elements.

- ▶ ρ can change over time because of
 - ▶ Changes in the dispersion of daughters' and fathers' (standardized) education around their respective means (term A)
 - ▶ Changes in daughters' educational attainment conditional on fathers' education (term B)
 - ▶ Changes in the unconditional distribution of fathers' education (term C).

Methodology IV

- ▶ Checchi et al. (2013) suggest that term B should be the policy-relevant indicator of intergenerational persistence
 - ▶ as changes in term A can be due to uniform convergence towards higher levels of education
 - ▶ as countries develop, one would expect an increase in the level of education of fathers across generations

Intergenerational persistence

	(1)	(2)	(3)	(4)	(5)	(6)
	1962-66	1967-71	1972-76	1977-81	1982-86	1987-91
Father's years of schooling ($\hat{\beta}$)	0.627*** (0.019)	0.584*** (0.017)	0.589*** (0.015)	0.595*** (0.014)	0.569*** (0.014)	0.535*** (0.013)
Father's years of schooling ($\hat{\rho}$)	0.550*** (0.017)	0.535*** (0.015)	0.542*** (0.013)	0.561*** (0.014)	0.537*** (0.013)	0.537*** (0.013)
SD in daughter's years of (σ_d)	4.548	4.663	4.899	5.085	5.123	4.969
SD in father's years (σ_f)	3.993	4.271	4.505	4.796	4.836	4.995
σ_f/σ_d	0.878	0.916	0.920	0.943	0.944	1.005
Mother's years of schooling ($\hat{\beta}$)	1.030*** (0.030)	0.936*** (0.025)	0.865*** (0.020)	0.814*** (0.017)	0.772*** (0.014)	0.640*** (0.013)
Mother's years of schooling ($\hat{\rho}$)	0.549*** (0.016)	0.538*** (0.014)	0.532*** (0.012)	0.548*** (0.011)	0.544*** (0.010)	0.528*** (0.010)
SD in daughter's years of (σ_d)	4.537	4.689	4.931	5.111	5.136	4.975
SD deviation in mother's years (σ_m)	2.417	2.695	3.035	3.440	3.618	4.101
σ_m/σ_d	0.533	0.575	0.615	0.673	0.704	0.824
Observations	5,483	5,953	6,553	6,319	6,920	7,478
R-squared	0.303	0.286	0.294	0.315	0.288	0.289

Table 4: Intergenerational persistence in educational attainment among daughters by social groups

	(1)	(2)	(3)	(4)	(5)	(6)
	1962-65	1966-70	1971-75	1976-80	1981-85	1986-90
<i>Social Group= Higher Hindu Castes</i>						
Father's years of schooling ($\hat{\beta}$)	0.527*** (0.027)	0.555*** (0.025)	0.476*** (0.028)	0.506*** (0.027)	0.537*** (0.037)	0.416*** (0.026)
Father's years of schooling ($\hat{\rho}$)	0.516*** (0.027)	0.563*** (0.026)	0.514*** (0.030)	0.560*** (0.030)	0.584*** (0.041)	0.504*** (0.031)
SD in daughter's years of (σ_d)	4.993	4.919	4.827	4.640	4.767	4.121
SD deviation in father's years (σ_f)	4.886	4.992	5.207	5.136	5.188	4.993
σ_f/σ_d	0.979	1.015	1.079	1.107	1.088	1.211
Observations	1,318	1,401	1,478	1,387	1,426	1,520
R-squared	0.266	0.318	0.264	0.313	0.342	0.254
<i>Social Group= Other Backward Castes</i>						
Father's years of schooling ($\hat{\beta}$)	0.554*** (0.041)	0.480*** (0.034)	0.561*** (0.026)	0.523*** (0.027)	0.524*** (0.025)	0.494*** (0.026)
Father's years of schooling ($\hat{\rho}$)	0.486*** (0.036)	0.437*** (0.031)	0.503*** (0.024)	0.481*** (0.025)	0.483*** (0.023)	0.484*** (0.025)
SD in daughter's years of (σ_d)	4.247	4.397	4.758	4.943	5.070	4.902
SD deviation in father's years (σ_f)	3.724	4.004	4.262	4.554	4.675	4.809
σ_f/σ_d	0.877	0.911	0.896	0.921	0.922	0.981
Observations	1,826	1,984	2,289	2,141	2,262	2,304
R-squared	0.236	0.191	0.253	0.232	0.233	0.234
<i>Social Group= Scheduled Castes/Tribes</i>						
Father's years of schooling ($\hat{\beta}$)	0.518*** (0.051)	0.520*** (0.040)	0.511*** (0.035)	0.599*** (0.035)	0.505*** (0.033)	0.540*** (0.026)
Father's years of schooling ($\hat{\rho}$)	0.410*** (0.041)	0.435*** (0.034)	0.431*** (0.029)	0.529*** (0.031)	0.446*** (0.029)	0.482*** (0.023)
SD in daughter's years of (σ_d)	3.331	3.893	4.136	4.711	4.797	4.935
SD deviation in father's years (σ_f)	2.640	3.251	3.490	4.163	4.237	4.408
σ_f/σ_d	0.793	0.835	0.844	0.884	0.883	0.893
Observations	1,514	1,738	1,847	1,866	2,137	2,361
R-squared	0.168	0.189	0.186	0.280	0.199	0.232
<i>Social Group= Muslims</i>						
Father's years of schooling ($\hat{\beta}$)	0.504*** (0.053)	0.451*** (0.047)	0.454*** (0.047)	0.515*** (0.041)	0.498*** (0.037)	0.523*** (0.031)
Father's years of schooling ($\hat{\rho}$)	0.516*** (0.054)	0.452*** (0.047)	0.423*** (0.043)	0.454*** (0.037)	0.463*** (0.034)	0.497*** (0.029)
SD in daughter's years of (σ_d)	3.667	4.028	4.256	4.774	4.755	4.853
SD deviation in father's years (σ_f)	3.750	4.030	3.971	4.212	4.416	4.613
σ_f/σ_d	1.023	1.001	0.933	0.882	0.929	0.951
Observations	630	626	769	761	931	1,107
R-squared	0.266	0.204	0.179	0.206	0.214	0.247

Note: *** p<0.01, ** p<0.05, * p<0.1; Robust standard errors in parentheses.

Table 5: Decomposition of persistence measured by correlation (ρ)

	<i>Daughter-stage attended</i>	<i>Father-stage attended</i>	1962-66	1967-71	1972-76	1977-81	1982-86	1987-91
1	D:No education	F:No education	0.249	0.210	0.173	0.149	0.113	0.062
2	D:Primary	F:No education	0.057	0.055	0.060	0.049	0.047	0.037
3	D:Middle	F:No education	0.031	0.035	0.035	0.043	0.047	0.041
4	D:Secondary	F:No education	0.023	0.026	0.033	0.038	0.046	0.053
5	D:College	F:No education	0.002	0.002	0.003	0.003	0.006	0.010
6	Total contribution to the correlation coefficient of the group of daughters with not educated father		0.362	0.329	0.304	0.283	0.259	0.203
7	D:No education	F:Primary	0.033	0.031	0.028	0.025	0.019	0.014
8	D:Primary	F:Primary	0.015	0.015	0.018	0.014	0.013	0.012
9	D:Middle	F:Primary	0.012	0.013	0.014	0.017	0.017	0.018
10	D:Secondary	F:Primary	0.013	0.015	0.020	0.023	0.025	0.035
11	D:College	F:Primary	0.002	0.002	0.003	0.004	0.006	0.013
12	Total contribution to the correlation coefficient of the group of daughters with Primary attended father		0.075	0.077	0.084	0.082	0.080	0.092
13	D:No education	F:Middle	0.011	0.012	0.011	0.011	0.009	0.006
14	D:Primary	F:Middle	0.008	0.009	0.010	0.008	0.008	0.007
15	D:Middle	F:Middle	0.008	0.009	0.010	0.013	0.013	0.012
16	D:Secondary	F:Middle	0.013	0.015	0.020	0.025	0.028	0.033
17	D:College	F:Middle	0.004	0.004	0.005	0.007	0.010	0.019
18	Total contribution to the correlation coefficient of the group of daughters with Middle attended father		0.045	0.049	0.057	0.063	0.068	0.077
19	D:No education	F:Secondary	0.007	0.008	0.008	0.009	0.006	0.004
20	D:Primary	F:Secondary	0.007	0.008	0.009	0.009	0.008	0.006
21	D:Middle	F:Secondary	0.010	0.012	0.012	0.017	0.016	0.014
22	D:Secondary	F:Secondary	0.020	0.025	0.032	0.047	0.045	0.053
23	D:College	F:Secondary	0.011	0.011	0.015	0.023	0.028	0.050
24	Total contribution to the correlation coefficient of the group of daughters with Secondary attended father		0.056	0.064	0.075	0.105	0.103	0.127
25	D:No education	F:College	0.000	0.000	0.000	0.000	0.000	0.000
26	D:Primary	F:College	0.000	0.001	0.001	0.001	0.000	0.001
27	D:Middle	F:College	0.001	0.001	0.001	0.002	0.002	0.001
28	D:Secondary	F:College	0.004	0.006	0.008	0.010	0.009	0.011
29	D:College	F:College	0.004	0.005	0.008	0.011	0.013	0.024
30	Total contribution to the correlation coefficient of the group of daughters with College attended father		0.009	0.013	0.018	0.023	0.025	0.037
31	Correlation Coefficient		0.547	0.531	0.538	0.557	0.535	0.535

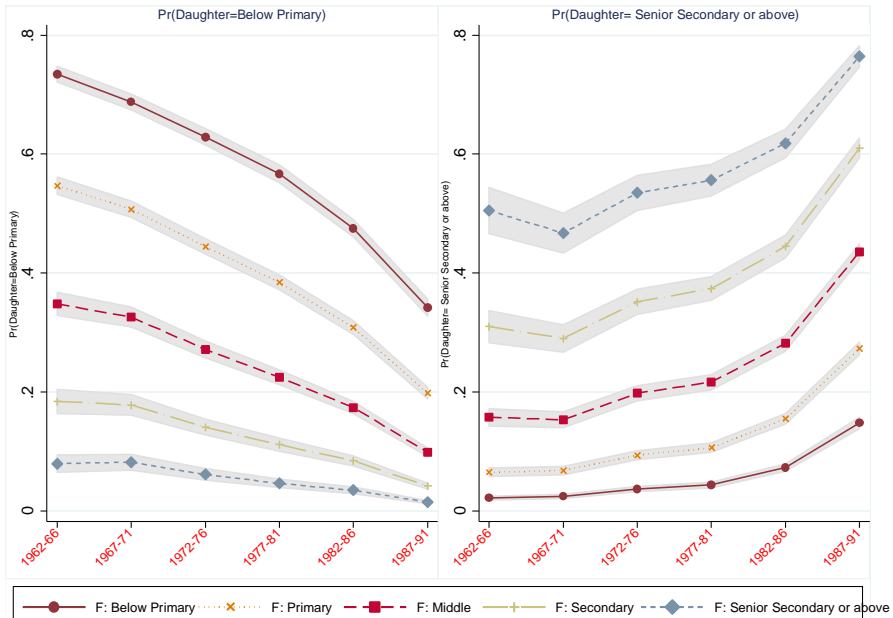
Note: The continuous years of schooling is grouped to refer attended stages of schooling. No education: 0 years; Primary: 1-5 years; Middle: 6-8 years; Secondary: 9-12 years; and College: 13 -16 years.

Table A2: Decomposition of persistence measured by correlation (ρ)

	<i>Daughter- stage attended</i>	<i>Mother-stage attended</i>	1962-66	1967-71	1972-76	1977-81	1982-86	1987-91
1	D:No education	M:No education	0.281	0.248	0.200	0.173	0.134	0.072
2	D:Primary	M:No education	0.077	0.080	0.085	0.070	0.067	0.051
3	D:Middle	M:No education	0.049	0.058	0.057	0.070	0.077	0.066
4	D:Secondary	M:No education	0.042	0.049	0.064	0.076	0.089	0.107
5	D:College	M:No education	0.004	0.004	0.006	0.008	0.013	0.027
6	Total contribution to the correlation coefficient of the group of daughters with not educated mother		0.453	0.438	0.412	0.397	0.381	0.324
7	D:No education	M:Primary	0.015	0.013	0.013	0.013	0.009	0.006
8	D:Primary	M:Primary	0.010	0.009	0.011	0.009	0.008	0.007
9	D:Middle	M:Primary	0.010	0.011	0.011	0.014	0.014	0.012
10	D:Secondary	M:Primary	0.017	0.017	0.022	0.028	0.029	0.034
11	D:College	M:Primary	0.005	0.004	0.006	0.008	0.010	0.019
12	Total contribution to the correlation coefficient of the group of daughters with Primary attended mother		0.058	0.055	0.062	0.071	0.070	0.079
13	D:No education	M:Middle	0.002	0.002	0.002	0.003	0.002	0.001
14	D:Primary	M:Middle	0.002	0.002	0.003	0.003	0.002	0.002
15	D:Middle	M:Middle	0.003	0.004	0.004	0.006	0.006	0.005
16	D:Secondary	M:Middle	0.009	0.012	0.014	0.019	0.021	0.023
17	D:College	M:Middle	0.006	0.007	0.008	0.011	0.015	0.025
18	Total contribution to the correlation coefficient of the group of daughters with Middle attended mother		0.020	0.027	0.031	0.041	0.046	0.056
19	D:No education	M:Secondary	0.000	0.000	0.000	0.001	0.000	0.000
20	D:Primary	M:Secondary	0.000	0.000	0.001	0.001	0.000	0.001
21	D:Middle	M:Secondary	0.001	0.001	0.002	0.003	0.002	0.003
22	D:Secondary	M:Secondary	0.004	0.006	0.010	0.014	0.013	0.019
23	D:College	M:Secondary	0.006	0.008	0.012	0.016	0.020	0.036
24	Total contribution to the correlation coefficient of the group of daughters with Secondary attended mother		0.011	0.016	0.025	0.034	0.036	0.059
25	D:No education	M:College	0.000	0.000	0.000	0.000	0.000	0.000
26	D:Primary	M:College	0.000	0.000	0.000	0.000	0.000	0.000
27	D:Middle	M:College	0.000	0.000	0.000	0.000	0.000	0.000
28	D:Secondary	M:College	0.000	0.000	0.000	0.001	0.001	0.001
29	D:College	M:College	0.001	0.002	0.002	0.005	0.006	0.010
30	Total contribution to the correlation coefficient of the group of daughters with College attended mother		0.001	0.002	0.003	0.005	0.007	0.011
31	Correlation Coefficient		0.544	0.538	0.532	0.548	0.540	0.529

Note: The continuous years of schooling is grouped to refer attended stages of schooling. No education: 0 years; Primary: 1-5 years; Middle: 6-8 years; Secondary: 9-12 years; and College: 13 -16 years.

Figure 1: Probability of daughters' education conditional on fathers' education



Note: The shaded area represents 95% confidence intervals

Figure 2: Probability of daughters achieving Below Primary conditional on fathers' education by caste

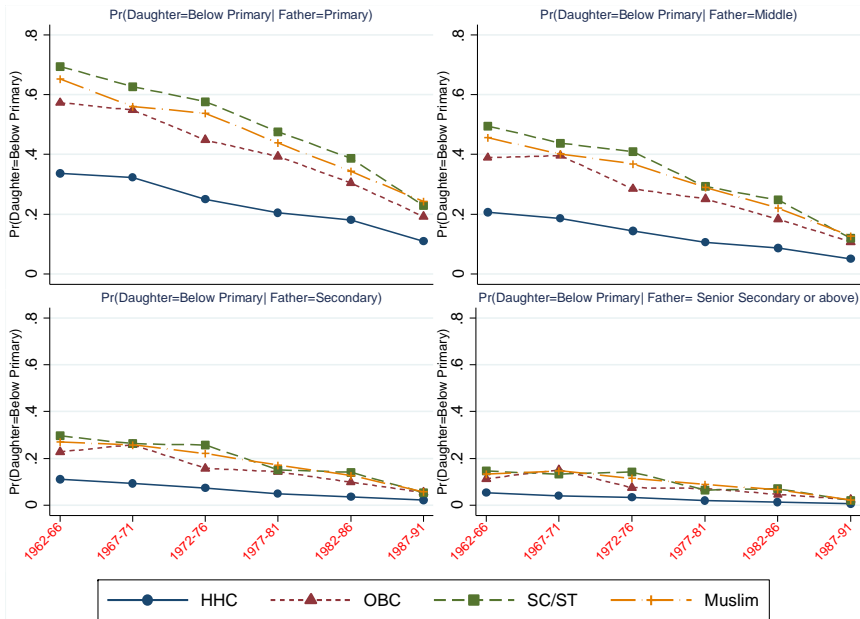


Figure 3: Probability of daughters achieving Senior Secondary or above conditional on fathers' education by caste

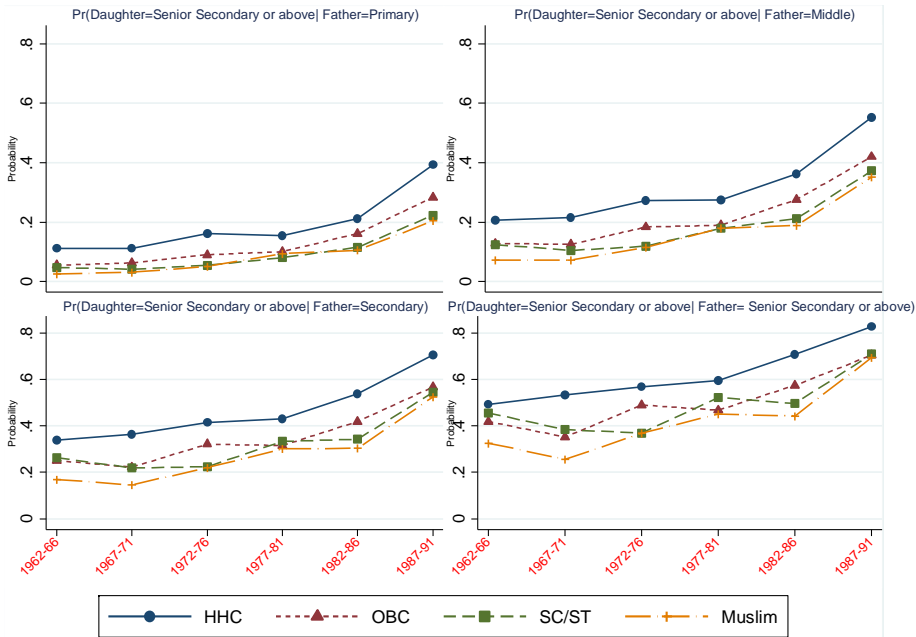
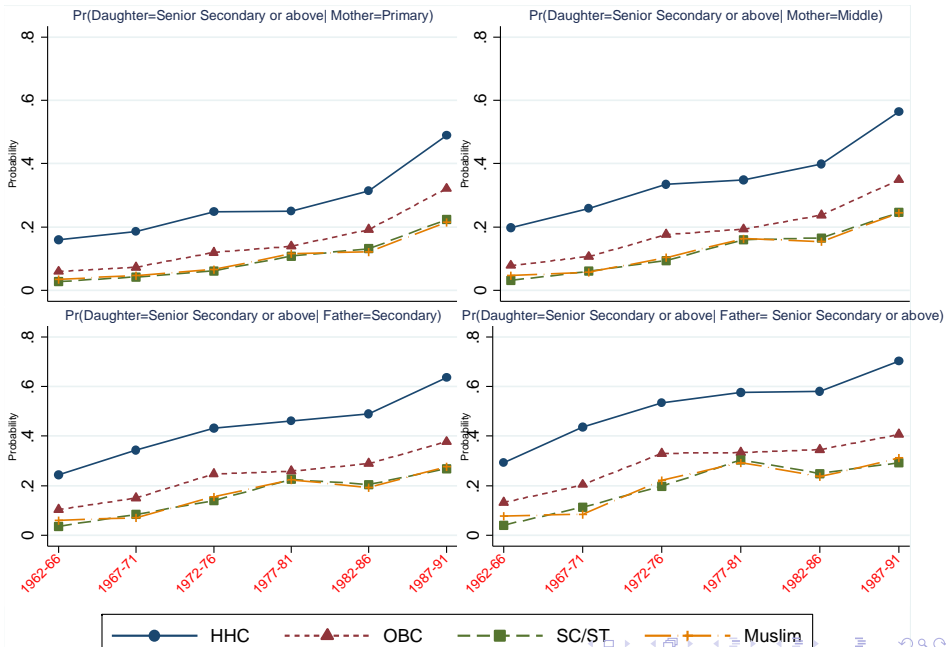


Figure A3: Probability of daughters achieving Post-Secondary conditional on mothers' education by caste



Conclusion

- ▶ “Equality of Opportunity” remains an elusive goal for India.
- ▶ The inequality of opportunities is starker once we consider probability of a daughter attaining senior secondary or above education (top end of the education distribution).
 - ▶ Not only the probability of a daughter attaining senior secondary or above education is positively associated with father education levels, the gaps in those probabilities do not show any signs of convergence.
- ▶ The gap between the Higher Hindu Castes and the disadvantaged groups such as Other Backward Castes, Scheduled Castes/Tribes remains, and does not show any sign of decline over time.