APPENDIX

This appendix presents the details of the simulations underlying the back-of-the-envelope calculations presented in the conclusion of the paper and the predictions for 2010 included in Table 1. Figures displaying the college-premium for each of the 50 states follow.

The within-state regression analyzes presented in the body of the paper shows that there is a tight link between higher education policies, past enrollment rates, and recent changes in the college wage premium among labor market entrants. The own-cohort supply effect identified through lagged enrollment rates or through their predicted values from state-specific higher education policies and demographics is indeed highly significant. Higher education policies also have significant impacts on enrollments, although the relative importance of tuition levels versus state appropriations varies by decade.

This section attempts to address the issue of the magnitude of the impact of higher education policies, a manipulable policy instrument, by comparison with arguably the most important demographic shock of the 20th century, the baby boom. Appendix Table 1 reproduces the educational numbers of Table 1 in panel A and reports the simulation results in panel B. The simulations are based on the 3-step procedure implemented with Census data as in Tables 10 and 11. These yield state-level predictions which are then aggregated up to provide U.S. estimates. The back-of-the-enveloppe calculations use the aggregate numbers presented in Table 1, which are based on CPS data. The programs used to produce the simulations are included in the on-line data.

I first describe the procedure used to obtain the predicted and simulated numbers, then I describe the simulations themselves. The equations used to generate the simulated public enrollment rate start with predicted enrolllment rates

$$\widehat{E^{\text{PUB}}_{st-9}} = \hat{\gamma}_0 + \hat{\gamma}_1 Col_{st-9} + \hat{\gamma}_2 Tui_{st-9} + \hat{\gamma}_3 App_{st-9} + \hat{\gamma}_s S_s + \hat{\gamma}_t t + \hat{\gamma}_{t^2} t^2. \tag{4}$$

Denoting simulated variables with tilde, a simulated enrollment rate from a change in tuition policy, for example, is obtained by computing a simulated value of tuition levels $\widetilde{Tui}_{st-9}$ and adding the induced effect to predicted public enrollment rates after having

removed the effect of the actual tuition level.

$$\widetilde{E^{\text{PUB}}_{st-9}} = \widehat{E^{\text{PUB}}_{st-9}} - 0.13\,\widetilde{Tui}_{st-9} + 0.13\,Tui_{st-9},$$

where $\widehat{E^{\text{PUB}}_{st-9}}$ is the predicted value of enrollment rate using the original data and the original coefficients. Similarly, the impact of simulated college-age population will be given by

$$\widetilde{E^{\text{PUB}}_{st-9}} = \widehat{E^{\text{PUB}}_{st-9}} - 0.6\,\widetilde{Col}_{st-9} + 0.6\,Col_{st-9},$$

while the impact of simulated state-appropriations per-college-age person will be:

$$\widetilde{E^{\text{PUB}}_{st-9}} = \widehat{E^{\text{PUB}}_{st-9}} + 0.08\,\widetilde{App}_{st-9} - 0.08\,App_{st-9}.$$

The elasticities of enrollment rates with respect to tuition (-0.13), state-appropriations per-college-age person (0.08), and college-age person (-0.6) come from the column 4 of Table 3. All simulations are performed on predicted values of the variables, which show some very small departures from the original values when aggregated up at the national level. The simulated numbers are thus very similar to the back-of-the-enveloppe calculations.

Second, the equation used to predict the relative supplies corresponds to the first-stage of the two-stage estimation of the inverse demand equation (2)

$$\widehat{q_{st}} = \hat{\pi}_0 + \hat{\pi}_1\,\widehat{E^{\text{PUB}}_{st-9}} + \hat{\pi}_2 E^{\text{PRI}}_{st-9} + \hat{\pi}_3 q^{O}_{st} + \hat{\pi}_4 U_{st} + \hat{\pi}_s S_s + \hat{\pi}_t t + \hat{\pi}_{t^2} t^2 \tag{3}$$

Again, the simulated value of relative supplies is obtained by adding the induced effect of the simulated public enrollment rates $\widetilde{E^{\text{PUB}}_{st-9}}$ to the predicted relative supplies after having removed the effect of the actual public enrollment rates,

$$\widetilde{q_{st}} = \widehat{q_{st}} + 0.6\,\widetilde{E^{\text{PUB}}_{st-9}} - 0.6\widehat{E^{\text{PUB}}_{st-9}}.$$

The estimates of the elasticity of relative supply with respect to enrollment rates are less precisely estimated. But a consensus elasticity of 0.6 emerges from Table 3 (using CPS data) and Table 10 (using Census data). The elasticities with respect to predicted

enrollment are higher at 1.2, so that the simulations are conservative.

Finally, the equation used to predict the college-premium is the following,

$$\widehat{r_{st}^{D}} = \hat{\alpha}_0 - \hat{\alpha}_1 \widehat{q_{st}} + \hat{\alpha}_2 q_{st}^{O} + \hat{\alpha}_3 U_{st} + \hat{\alpha}_s S_s + \hat{\alpha}_t t + \hat{\alpha}_{t^2} t^2, \tag{2}$$

and the simulated values of the college premia are obtained from

$$\widetilde{r_{st}^{D}} = \widehat{r_{st}^{D}} - 0.2\,\widetilde{q_{st}} + 0.2\,\widehat{q_{st}}.$$

I describe now how the predicted numbers for 2010 were obtained. The public and private enrollment rates needed to predict the 2010 relative supplies are those of 2000. The exercise thus begin with equation (3). Clearly, what is missing are the values of the relative supply of older workers and the unemployment rate in 2010. These are simulated by applying the corresponding growth rates of the 1990s into the 2000s. It is then possible to obtain predicted relative supplies for 2010 using equation (3), these predicted values of relative supplies are then inserted into equation (2), which yields predicted college premia. Aggregating the state-level numbers gives the one presented in Table 1.

Turning to the simulations displayed in panel B of Appendix Table A1. Simulation 1) hold tuition constant at the 1980 levels. This simulation simply assign the 1980 tuition level numbers to 1990 and 2000. Simulation 2) assume that the growth rate in state appropriations per-college-age person witness in the 1980s would have been sustained in the 1990s. The levels of state appropriations in 2000 are thus simulated by applying the 1980s growth rate to the 1990 levels. Simulation 3) hold college-age-population at the 1970 levels. It simply assigns the 1970 state college-age-population numbers to 1990 and 2000.

The simulated public enrollment rates, relative supplies, and college premium are displayed in panel B of Appendix Table 1. Discrepancies in the college premium and relative supplies with Table 1 in the paper are due to well-documented (Katz and Autor, 1999) differences between CPS and Census numbers. The simulations show that holding tuition constant at the historically low 1980 levels (simulation 1) or sustaining the 1980s growth in state-appropriations per-college-age person into the 1990s (simulation 2) has the same impact as assuming that the baby boom did no take place (simulation 4).

Appendix Table 1—Levels, Growth Rates and Simulation Results for Selected Variables - United States

Years	1970	%Δ	1980	%Δ	1990	%Δ	2000
A: Actual levels and annualized growth rates:							
State-appropriations per college age person (in $2000)	1,115	1.8	1,333	3.6	1,912	0.9	2,088
Average tuition (in $2000)	3,070[a]	-3.6	2,140	4.2	3,260	4.1	4,900
College age population (in 1000's)	24,712	2.0	30,022	-1.1	26,956	0.1	27,141
FTE-4yr public enrollees (in 1000's)	3,469	1.8	4,158	1.3	4,740	0.6	5,026
FTE-4yr private enrollees (in 1000's)	1,677	1.8	2,003	1.1	2,228	2.2	2,770
Public enrollment rate	14.0	-0.1	13.9	2.4	17.6	0.5	18.5
A decade later: Census numbers							
Relative supplies			-0.854	3.1	-0.539	2.2	-0.321
Log college premium			0.283	1.4	0.426	0.6	0.482
B: Simulations:							
1) Tuition held constant at 1980 levels							
Public enrollment rate	14.7	-0.8	13.7	2.7	18.3	1.6	21.5
Relative supplies			-0.855	3.1	-0.541	2.5	-0.291
Log college premium			0.283	1.4	0.426	0.5	0.475
2) College-age population held constant at 1970 levels (No baby boom)							
Public enrollment rate	14.4	1.2	16.3	1.4	18.8	1.0	20.9
Relative supplies			-0.855	4.0	-0.435	1.8	-0.272
Log college premium			0.283	1.3	0.409	0.6	0.473

Notes: The growth rates are computed as the difference between the logarithms of the levels divided by 10. The simulations of enrollment rates use the elasticities with respect to tuition (-0.13) and state-appropriations per-college-age person (0.08) more precisely estimated in table 3, column 4. The simulations of relative supplies use an elasticity with respect to public enrollment rates of 0.6. The simulations of log college premium use a own-cohort supply effect of -0.2.

[a]For 1972-73.

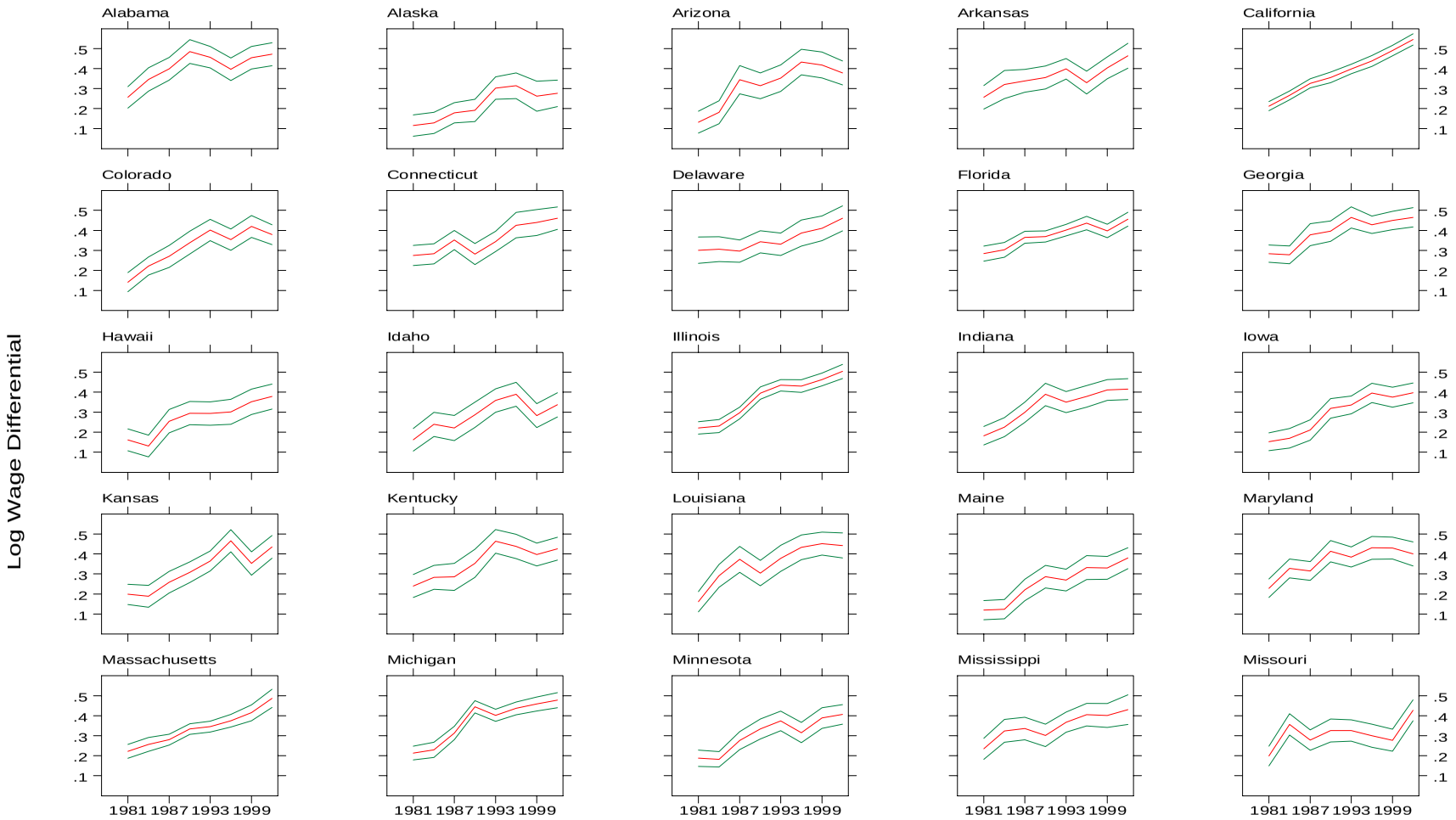

Figure A1a. College/HS Log Wage Premium by State
(thick line) with 95% Confidence Bands (thin lines)

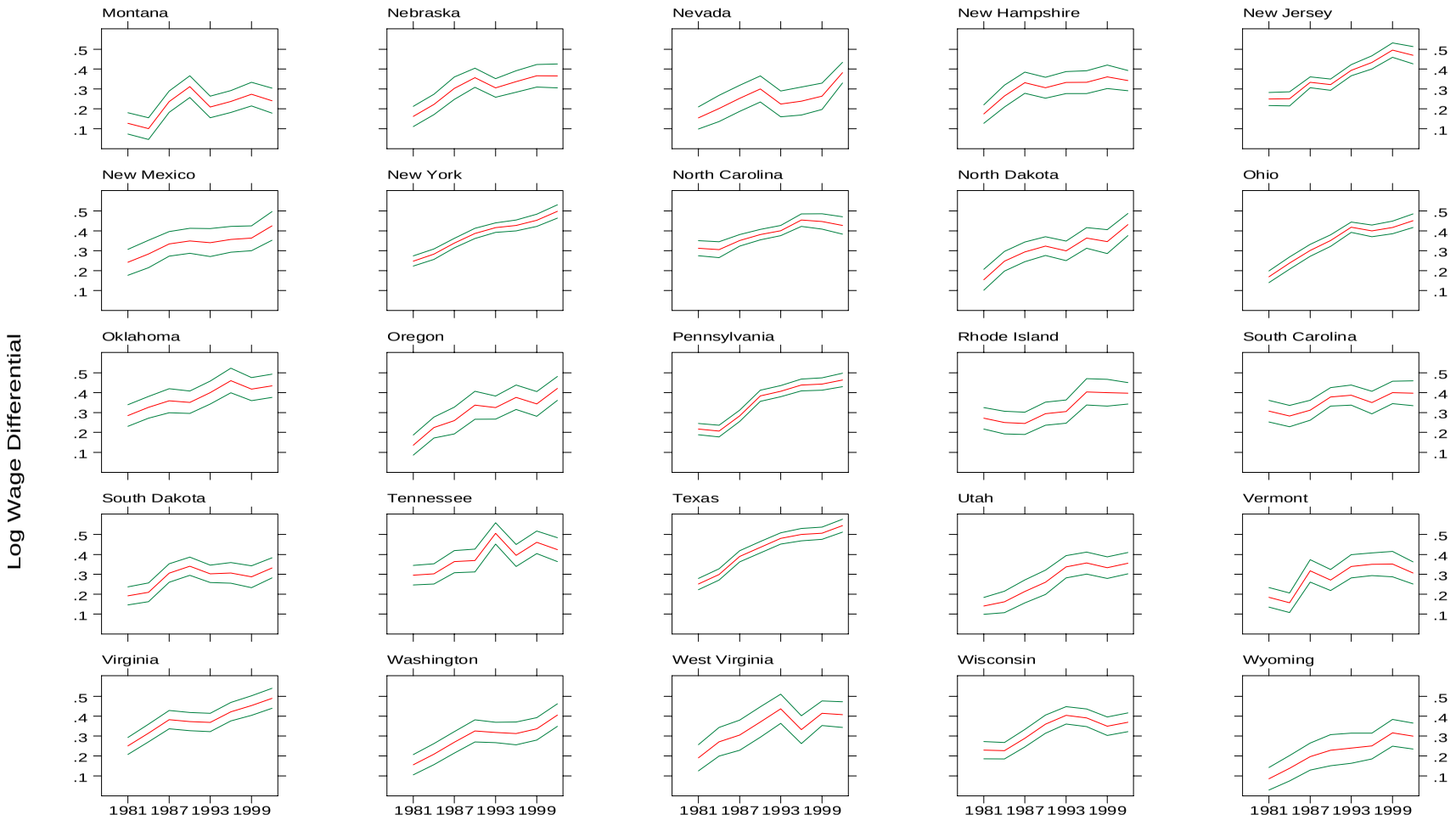

Figure A1b. College/HS Log Wage Premium by State
(thick line) with 95% Confidence Bands (thin lines)