The Cost Effectiveness of Public Investment in High-Quality Prekindergarten: A State Level Synthesis

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What Science Tells us About Pre-K in the States

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Numerous studies have calculated the cost effectiveness of public investment in high-quality prekindergarten. The benefits and costs of investment in pre-k have typically been quantified in standard benefit-cost ratios expressed in net present value terms or in rate of return calculations. Long term analyses of high-quality pre-k programs have found favorable benefit/cost ratios that varied from a minimum of 3.78 to 1 to a high of 17.07 to 1 (e.g. Barnett 1993, Masse and Barnett 2002, Schweinhart et al 1993, Reynolds et al 2002, Schweinhart et al 2005). Rate of return calculations have similarly illustrated cost effectiveness. For example, Rolnick and Grunewald (2003) estimated that annual real rates of return on public investments in the Perry Preschool pre-k program were 12% for the non-participating public and government, and 4% for participants, so that total returns exceeded 16%.

One drawback of these methods of calculating the cost effectiveness of pre-k investment is that they are not well understood or routinely used by the legislators, typically at the state level, who actually formulate public policy with respect to pre-k. State legislators are more likely to examine the budgetary implications of policy proposals by analyzing their state-level year-by-year expenditure and revenue impacts. Thus, one potentially useful way of depicting the overall benefits and costs of pre-k investment is to translate net present value benefit/cost ratios and rate of return calculations into annual budget outlay and revenue consequences for each state. This is the approach adopted here and outlined in more detail in Lynch (2007).

Specifically, this paper analyzes the costs and many, but not all, of the benefits of public investment in 1.a ***targeted*** voluntary, high-quality pre-k program that serves only three- and four-year-old children who live in families in the lowest quarter of the income distribution and 2. A similar but ***universal*** voluntary pre-k program made available to all three- and four-year-old children. Both pre-k programs and their estimated costs and benefits are modeled on the Chicago Child-Parent Center (CPC) program (see Reynolds 2000 and Reynolds et al 2002 for details). The governmental costs and benefits of both publicly funded pre-k programs, measured as year-by-year expenditure, budget savings and

revenue impacts, are estimated from hypothetical program implementation in 2007 through the year 2050 or over a period of 44 years. For illustration purposes, we assume that the programs would be fully phased in by 2008. In addition to the government budgetary consequences, the earnings and crime implications for individuals and society are calculated for the same years. All these costs and benefits are broken down at the national level and state-by-state and are expressed in real 2006 dollars (see Lynch 2007 for a full description of the methodology).

The next section describes the costs and benefits of each prospective pre-k program for every state to illustrate their potential cost effectiveness. This is followed by a discussion of omitted costs and benefits and an explanation of some of the difficulties in estimating the effects of prospective pre-k programs. A sensitivity analysis is performed to account for a wide range of estimates of the effects of current preschool participation and the impact of pre-k on children from different economic backgrounds on the cost effectiveness of high-quality pre-k. Finally, the policy implications of this study are discussed.

The Cost Effectiveness of High-Quality Prekindergarten:

Our state-level estimates capture variation in costs and benefits across states due to factors such as population, income distribution, average annual pay, teacher salaries, crime rates, tax burdens, and current expenditures on all levels of education, child welfare, and criminal justice. States with greater current commitments to pre-k need less additional public expenditure to finance the proposed high-quality pre-K program. Given that pre-k costs are largely driven by teacher salaries, states with higher teacher pay experience greater pre-k costs. Since the proposed pre-k programs generate budget savings in special education, K-12 education, juvenile and adult criminal justice, and child welfare, states which are making larger financial commitments in these areas save more money than states which are making smaller financial commitments in these areas. Likewise, since the prospective pre-K programs increase

the future earnings of participants and their guardians, states with higher average pay and tax burdens will experience greater earnings and revenues increases than will states with lower average pay and tax burdens. Differences in state-level savings to individuals from less crime are largely due to variations in state crime rates.

While the costs and benefits from pre-k investment vary by state, the pattern of cost and benefit growth is similar across states. Initially, the costs of the program will be relatively stable, growing only with inflation and increases in the child population served. Eventually, however, there will be additional increases in government expenditures due to the increased educational attainment of pre-K participants who complete more years of high school and attend college at higher rates. Increased public high-school costs appear when the first cohort of participants turns 17 and increased public higher education costs appear when the first cohort turns 18.

Offsetting budget, earnings, and crime benefits will be small initially but they will grow rapidly and eventually outstrip the costs. Budget savings in the first year of the program will manifest themselves as reductions in child welfare expenditures as pre-k participants will be less likely to be the victims of child abuse and neglect. In addition, some parents will take advantage of the fact that part of their child care needs will be covered by the pre-k program. They will secure employment, earn income, and pay more in taxes. When the pre-K participants enter the K-12 public school system, additional budget savings appear, as these children will be less likely to repeat a grade or need expensive special education services. When the first cohort of children turns 10 further budget and crime savings will begin to be realized as pre-k participants will have lower juvenile crime rates, generating savings in public expenditures on the juvenile justice system. As adults, the pre-K participants will be less engaged in crime, have higher educational attainment, and earn more income. Thus there will eventually be savings to the adult criminal justice system and increased tax revenue derived from the labor earnings of pre-k participants.

Cost effectiveness of a targeted program:

The annual budgetary, earnings, and crime benefits of a high-quality, publicly funded, *targeted* pre-k program would begin to exceed the annual costs of the program within six years and would do so by a growing margin every year thereafter. After forty four years or by the year 2050, the annual benefits would total $315 billion ($83 billion in government budget benefits, $156 billion in increased compensation of workers, and $77 billion in reduced costs to individuals from less crime and child abuse) and would surpass the costs of the program in that year by a ratio of 12.1 to 1.[1] Broken down by state, in 2050 the annual benefits would outstrip the annual costs of the program by a minimum of 8.1 to 1 for residents of Alabama and by as much as 29.1 to 1 for the residents of Delaware (see Table 1).

Table 1: State-by-State Costs and Benefits of Targeted Program

State	Government Budget Benefits in 2050 (Millions of 2006 Dollars)	Increased Compensation in 2050 (Millions of 2006 Dollars)	Savings to Individuals from Reduced Crime in 2050 (Millions of 2006 Dollars)	Total Budget, Compensation and Crime Benefits in 2050 (Millions of 2006 dollars)	Ratio of Total Annual Benefits to Program Costs in 2050
National	82,659	155,519	76,969	315,147	12.1
Alabama	890	2,219	594	3,703	8.1
Alaska	197	452	217	865	13.1
Arizona	2,681	4,917	3,217	10,814	11.4
Arkansas	822	1,393	722	2,937	12.0
California	12,551	25,670	9,750	47,971	12.1
Colorado	1,052	2,090	1,455	4,596	16.7
Connecticut	667	1,347	489	2,504	23.8
Delaware	111	211	123	445	29.1
District of Columbia	387	656	367	1,410	10.3
Florida	5,897	8,995	5,580	20,472	9.9
Georgia	3,376	6,019	3,122	12,517	11.3
Hawaii	217	458	245	920	17.3

[1]These benefits of a targeted program are similar in magnitude to those estimated in Lynch (2004) for a targeted program modeled on the Perry Preschool program.

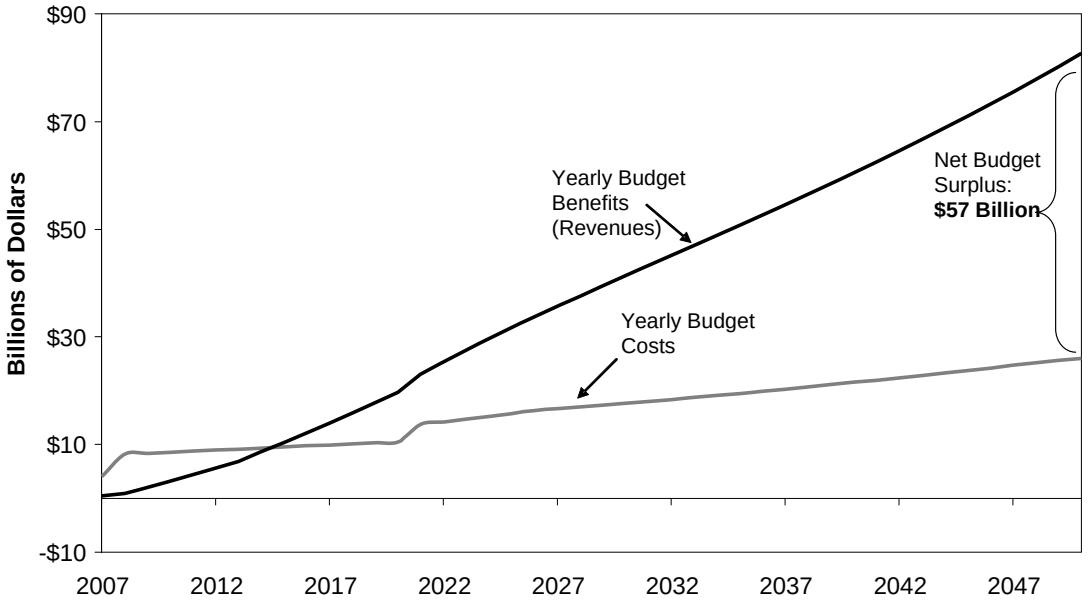
Idaho	395	763	573	1,731	13.1
Illinois	3,134	6,185	2,914	12,233	12.6
Indiana	1,327	2,982	1,549	5,858	9.8
Iowa	526	1,096	550	2,172	13.1
Kansas	654	1,230	618	2,502	14.1
Kentucky	1,205	1,961	1,220	4,386	17.5
Louisiana	1,086	2,058	1,248	4,392	11.9
Maine	177	347	190	714	16.2
Maryland	1,243	2,511	1,065	4,820	13.6
Massachusetts	874	1,998	537	3,409	13.6
Michigan	2,414	4,702	1,385	8,501	13.8
Minnesota	982	1,829	1,139	3,950	27.0
Mississippi	796	1,574	1,004	3,374	12.3
Missouri	1,283	2,580	1,124	4,987	12.6
Montana	177	328	210	716	13.2
Nebraska	359	719	413	1,491	13.9
Nevada	805	1,535	1,095	3,436	11.0
New Hampshire	149	352	124	626	15.2
New Jersey	1,175	2,520	896	4,591	16.3
New Mexico	549	1,019	599	2,168	12.1
New York	5,942	8,884	4,533	19,359	12.0
North Carolina	2,762	4,941	2,548	10,251	8.8
North Dakota	91	164	130	386	24.1
Ohio	2,477	4,652	2,442	9,571	16.7
Oklahoma	658	1,471	772	2,901	13.3
Oregon	949	1,826	1,202	3,978	15.3
Pennsylvania	2,634	4,740	2,530	9,903	12.4
Rhode Island	249	479	202	929	11.6
South Carolina	1,081	2,025	943	4,049	9.8
South Dakota	179	344	192	715	14.2
Tennessee	1,550	2,952	991	5,492	9.2
Texas	8,962	18,966	9,899	37,828	11.3
Utah	687	1,480	916	3,083	13.7
Vermont	77	154.4	34	266	20.4
Virginia	1,428	3,516	883	5,826	10.5
Washington	1,607	3,342	1,408	6,357	12.8
West Virginia	289	563	142	994	11.8
Wisconsin	1,385	2,559	1,161	5,104	13.6
Wyoming	83	154.1	125	362	19.7

A high-quality targeted pre-k program would cost nearly $6,300 per participant and could be expected to enroll just over two million children in 2008 when it is fully phased in. With offsets for

some current expenditure on state pre-k programs, special education, and Head Start services for children who will be attending the proposed high-quality pre-k program, the program would require $8.2 billion in *additional* government outlays in 2008 once it is fully phased in.

Offsetting budget benefits take a while to outstrip the costs, but once they do the gap becomes substantially favorable over time. For the first 8 years of a targeted program, costs exceed offsetting budget benefits, but by a declining margin. Thereafter, starting in the ninth year, offsetting budget benefits exceed costs by a growing margin each year, culminating in a net budgetary surplus of some $57 billion in 2050, the last year estimated. This pattern is illustrated in figure 1 which shows annual revenue impacts and costs in real terms.

Figure 1:
Total Budget Costs and Benefits of Targeted Program



Source: Author's analysis

By 2050, every dollar spent on the program by taxpayers is offset by $3.18 in budget savings, or $83 billion, in that year. Approximately 38% of the total budgetary benefits accrue to the federal

government and 62% go to state governments. If the costs of the pre-k program were divided between the federal and state governments in proportion to their shares of the budgetary benefits the net budgetary benefit would be favorable in every state but would vary from state to state. For example, by 2050, every dollar spent on the program in Alabama would be offset by $1.95 in budget savings in that year and every dollar spent in Delaware would be offset by $7.25 in budget savings. On average, states would experience net budget savings within 9 years, but this varies from as few as four years in Connecticut, Delaware, and Vermont to no more than 18 years in Alabama (see Table 2).

Table 2: Government Budget Effects of Targeted Program, by State

State	Additional Taxpayer Costs in 2008 (Millions of 2006 Dollars)	Years before Annual Budget Benefits Exceed Annual Costs	Total Government Surplus in 2050 (Millions of 2006 Dollars)	Ratio of Government Budget Benefits to Program Costs in 2050
National	8,197	9	56,677	3.18
Alabama	171	18	434	1.95
Alaska	15	8	130	2.97
Arizona	247	11	1,735	2.84
Arkansas	78	8	577	3.36
California	1,311	9	8,593	3.17
Colorado	79	10	776	3.81
Connecticut	22	4	562	6.34
Delaware	4	4	96	7.25
District of Columbia	44	8	250	2.82
Florida	591	9	3,836	2.86
Georgia	316	9	2,264	3.04
Hawaii	18	8	164	4.10
Idaho	42	11	263	3.00
Illinois	343	9	2,165	3.23
Indiana	211	17	731	2.22
Iowa	67	10	360	3.17
Kansas	65	8	476	3.67
Kentucky	72	5	955	4.82
Louisiana	139	10	717	2.94
Maine	14	7	133	4.01
Maryland	103	9	890	3.52

Massachusetts	79	8	622	3.48
Michigan	207	7	1,798	3.92
Minnesota	32	5	836	6.70
Mississippi	105	10	522	2.90
Missouri	144	9	888	3.25
Montana	19	7	123	3.28
Nebraska	40	9	252	3.35
Nevada	73	12	493	2.58
New Hampshire	13	9	108	3.62
New Jersey	74	7	894	4.18
New Mexico	68	10	369	3.05
New York	569	7	4,326	3.68
North Carolina	313	11	1,596	2.37
North Dakota	5	5	75	5.70
Ohio	190	7	1,904	4.32
Oklahoma	70	11	440	3.02
Oregon	66	8	688	3.64
Pennsylvania	298	9	1,833	3.29
Rhode Island	29	9	169	3.12
South Carolina	141	10	668	2.62
South Dakota	18	8	128	3.54
Tennessee	184	10	949	2.58
Texas	943	12	5,610	2.67
Utah	68	13	462	3.05
Vermont	2.5	4	64	5.92
Virginia	169	13	872	2.57
Washington	129	10	1,112	3.24
West Virginia	31	6	204	3.43
Wisconsin	126	8	1,010	3.69
Wyoming	7	7	65	4.51

If the federal government refused to pay a share of the additional costs of the pre-k program and simply maintained its efforts in Head Start and special education (allowing states to move some federal Head Start and special education funds into the program, redistributing these federal commitments equitably among states, and holding states harmless from potential losses of federal funds)[2], the program would still be a worthwhile investment from the perspective of state budgets. On average, states would experience net budget savings within 10 years, varying from as few as four years in

Delaware to no more than 29 years in Alabama. By 2050 every state tax dollar spent on the program would be offset by an average of $2.15 in budgetary savings for state governments: by at least $1.17 in Alabama and by as much as $4.97 in Delaware. When compensation and crime benefits are added to the budget benefits, the ratio of total state benefits to program costs in 2050 would vary from a minimum of 7.9 to 1 in Alabama to 28.8 to 1 in Delaware (see Table 3).

Table 3: State-by-State Government Budget Effects of a State Funded Targeted Program with Federal Maintenance of Effort

State	Years Before Annual Budget Benefits Exceed Annual Costs	State Government Surplus in 2050 (Millions of 2006 Dollars)	Ratio of Government Budget Benefits to Program Costs in 2050	Ratio of Total State Benefits to State Program Costs in 2050	Federal Government Surplus in 2050 (Millions of 2006 Dollars)
National	10	27,456	2.15	11.9	29,221
Alabama	29	70	1.17	7.9	364
Alaska	10	46	1.77	12.9	84
Arizona	16	660	1.75	11.1	1,075
Arkansas	8	315	2.52	12.7	262
California	11	3,648	1.96	11.2	4,945
Colorado	11	383	2.47	16.1	392
Connecticut	5	331	4.27	22.4	231
Delaware	4	56	4.97	28.8	40
District of Columbia	11	108	1.81	9.5	142
Florida	10	2,029	2.14	10.3	1,807
Georgia	10	1,182	2.25	11.9	1,082
Hawaii	11	71	2.46	16.9	93
Idaho	16	106	1.83	12.3	158
Illinois	11	1,012	2.08	11.8	1,152
Indiana	21	203	1.36	9.3	528
Iowa	12	154	1.97	12.4	206
Kansas	10	217	2.26	13.0	260
Kentucky	6	545	3.31	16.8	410
Louisiana	11	325	1.92	11.3	391
Maine	10	61	2.45	15.2	72
Maryland	10	433	2.27	12.7	457
Massachusetts	9	277	2.14	12.5	345
Michigan	8	908	2.55	12.9	890
Minnesota	6	493	4.55	26.0	343
Mississippi	14	187	1.73	11.8	335
Missouri	12	338	1.88	11.5	550
Montana	10	51	2.03	13.0	73

[2] This results in states paying 95% and the federal government picking up 5% of the net program costs.

Nebraska	11	113	2.09	13.0	139
Nevada	14	209	1.73	10.9	284
New Hampshire	10	44	2.11	14.1	64
New Jersey	8	448	2.64	15.2	446
New Mexico	11	178	2.08	11.9	191
New York	8	2,522	2.62	11.2	1,805
North Carolina	12	750	1.75	9.3	846
North Dakota	8	40	3.79	24.3	35
Ohio	8	1,000	2.81	15.7	904
Oklahoma	16	165	1.83	13.0	275
Oregon	10	315	2.37	15.6	373
Pennsylvania	10	978	2.26	11.7	855
Rhode Island	11	80	2.03	10.8	89
South Carolina	11	299	1.82	9.9	369
South Dakota	11	55	2.16	13.5	73
Tennessee	11	385	1.67	8.5	564
Texas	12	2,540	1.95	12.7	3,069
Utah	17	182	1.84	12.9	280
Vermont	5	37	4.10	19.9	27
Virginia	14	293	1.58	10.2	578
Washington	12	504	2.08	12.2	607
West Virginia	8	93	2.18	11.1	111
Wisconsin	9	536	2.49	12.8	474
Wyoming	8	34	2.95	19.1	31

Regardless of which level of government pays the costs of the pre-k program the net budgetary benefits to all levels of government remain unchanged – only the cost burden shifts. In the case of a largely states funded program the federal government receives net budget benefits of over $29 billion in 2050 without incurring most of the costs of the program.

Cost Effectiveness of a Universal Prekindergarten Program:

The annual budgetary, earnings, and crime benefits of a voluntary, high-quality, publicly funded, *universal* pre-k program would begin to outstrip the annual costs of the program within nine years and would do so by a growing margin every year thereafter. By the year 2050, the annual benefits would total $779 billion: $191 billion in government budget benefits, $432 billion in increased compensation of workers, and $156 billion in reduced costs to individuals from less crime and child abuse. These annual benefits in 2050 would exceed the costs of the program in that year by a ratio of 8.2 to 1. Broken

down by state, in 2050 the total annual benefits would outstrip the annual costs of the program by a minimum of 6.1 to 1 for residents of Alabama and by as much as 11.4 to 1 for the residents of Wyoming (See Table 4).

Table 4: State-by-State Costs and Benefits of Universal Program

State	Government Budget Benefits in 2050 (Millions of 2006 Dollars)	Increased Compensation in 2050 (Millions of 2006 Dollars)	Savings to Individuals from Reduced Crime in 2050 (Millions of 2006 Dollars)	Total Budget, Compensation and Crime Benefits in 2050 (Millions of 2006 dollars)	Ratio of Total Annual Benefits to Program Costs in 2050
National	191,109	431,959	155,736	778,804	8.2
Alabama	1,795	5,019	997	7,812	6.1
Alaska	527	1,502	474	2,503	7.8
Arizona	5,317	11,783	5,866	22,965	7.9
Arkansas	1,526	3,079	1,204	5,809	8.5
California	26,482	64,408	17,927	108,816	8.4
Colorado	3,418	8,183	4,070	15,670	9.4
Connecticut	2,088	5,060	1,257	8,405	9.1
Delaware	311	735	311	1,358	11.2
District of Columbia	591	1,164	505	2,260	8.1
Florida	12,607	24,153	10,499	47,259	7.4
Georgia	7,189	15,396	5,847	28,432	9.0
Hawaii	811	2,066	769	3,646	9.0
Idaho	991	2,286	1,263	4,540	8.7
Illinois	7,673	17,908	6,169	31,750	8.9
Indiana	3,250	8,427	3,168	14,844	7.0
Iowa	1,380	3,402	1,219	6,001	8.4
Kansas	1,616	3,683	1,339	6,638	8.9
Kentucky	2,322	4,599	2,115	9,036	10.0
Louisiana	2,273	5,077	2,317	9,667	8.4
Maine	500	1,180	456	2,136	9.1
Maryland	4,251	10,434	3,061	17,747	8.7
Massachusetts	3,126	8,636	1,461	13,224	7.6
Michigan	5,514	12,800	2,727	21,041	8.1
Minnesota	3,921	9,015	3,901	16,837	10.2
Mississippi	1,326	3,017	1,518	5,862	8.4
Missouri	3,091	7,575	2,433	13,099	8.2
Montana	386	894	418	1,699	8.0

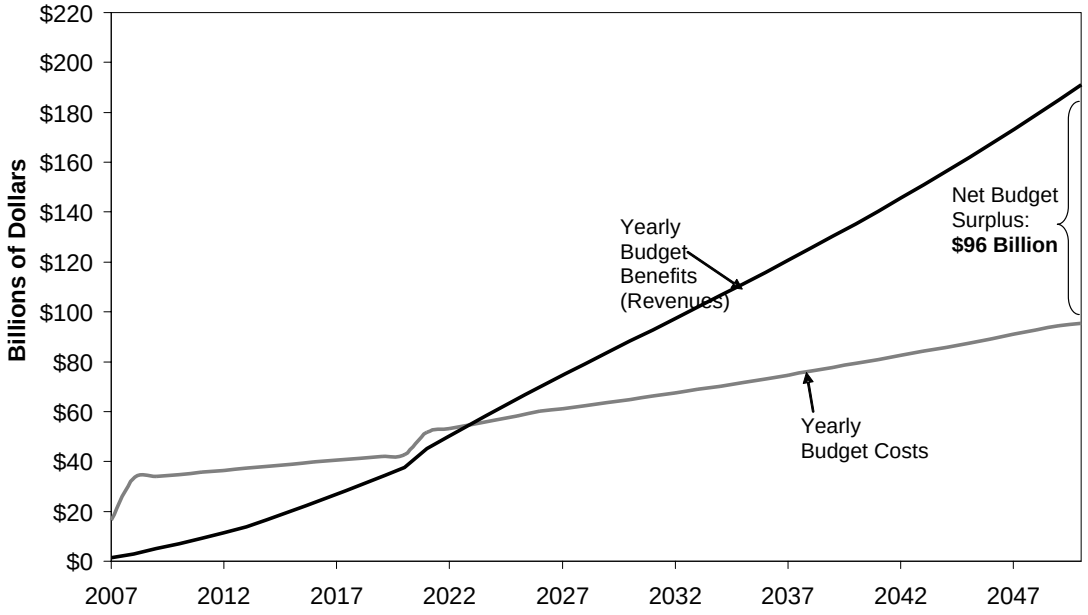
Nebraska	990	2,400	998	4,388	8.6
Nevada	2,174	5,109	2,612	9,895	7.7
New Hampshire	715	2,078	507	3,299	8.6
New Jersey	5,261	13,633	3,362	22,255	10.5
New Mexico	1,037	2,241	1,006	4,284	9.0
New York	12,685	23,184	8,662	44,531	9.4
North Carolina	6,029	12,933	4,746	23,708	6.9
North Dakota	276	616	348	1,240	10.1
Ohio	6,178	13,953	5,204	25,336	8.8
Oklahoma	1,673	4,308	1,609	7,589	8.5
Oregon	2,221	5,174	2,481	9,875	8.2
Pennsylvania	6,447	13,965	5,580	25,992	8.3
Rhode Island	571	1,315	402	2,288	8.0
South Carolina	2,304	5,157	1,770	9,231	7.5
South Dakota	402	936	381	1,718	9.0
Tennessee	3,344	7,721	1,853	12,918	6.4
Texas	17,167	41,978	16,759	75,904	8.0
Utah	2,271	5,776	2,507	10,554	8.8
Vermont	273	668	99	1,040	9.3
Virginia	4,545	13,073	2,332	19,950	7.7
Washington	4,135	10,086	3,120	17,341	7.7
West Virginia	572	1,327	225	2,124	7.9
Wisconsin	3,408	7,486	2,489	13,383	9.5
Wyoming	238	540	317	1,095	11.4

A high-quality universal pre-K program would cost almost $6,300 per participant and could be expected to enroll nearly seven million children in 2008 when it is fully phased in. With offsets for some of the current expenditures on state pre-k programs, special education and Head Start services for children who will be attending the proposed universal pre-K program, the program would require approximately $33.3 billion in *additional* government outlays in 2008.

Offsetting budget benefits take a while to outstrip the costs, but the gap becomes substantially favorable over time. For the first sixteen years of a universal pre-k program, costs exceed offsetting budget benefits, but by a declining margin. By the 17th year of the program, the deficit turns into a surplus that grows every year thereafter culminating in a net budgetary surplus of some $96 billion in 2050, the last year estimated. Thus by 2050, every dollar spent on the program by taxpayers is offset by

$2.00 in budget savings in that year. This pattern is illustrated in figure 2 which shows annual revenue impacts and costs portrayed in real terms.

Figure 2:
Total Budget Costs and Benefits of Universal Program



Source: Author's analysis

Approximately 42% of the budgetary benefits from a universal program accrue to the federal government and 58% go to state governments. If the costs of the pre-K program were divided between the federal government and state governments in proportion to their shares of the budgetary benefits, then for every dollar being spent on the program in 2050, Alabama will experience $1.41 in budget savings and New York would enjoy $2.67 in budget savings (see Table 5). The offsetting budget benefits exceed costs by state in as little as 10 years in Kentucky and New York and in as many as 29 years in Alabama (see Table 5).

Table 5: Government Budget Effects of Universal Program, by State

State	Additional Taxpayer Costs in 2008 (Millions of 2006 Dollars)	Years before Annual Budget Benefits Exceed Annual Costs	Total Government Surplus in 2050 (Millions of 2006 Dollars)	Ratio of Government Budget Benefits to Program Costs in 2050
National	33,338	17	95,605	2.00
Alabama	512	29	518	1.41
Alaska	89	21	206	1.64
Arizona	805	20	2,411	1.83
Arkansas	238	12	844	2.24
California	4,631	17	13,586	2.05
Colorado	560	19	1,749	2.05
Connecticut	349	17	1,159	2.25
Delaware	60	11	190	2.56
District of Columbia	95	12	312	2.12
Florida	1,894	14	6,258	1.99
Georgia	946	13	4,020	2.27
Hawaii	176	20	408	2.01
Idaho	181	19	468	1.90
Illinois	1,392	17	4,101	2.15
Indiana	800	25	1,135	1.54
Iowa	319	19	666	1.93
Kansas	306	16	867	2.16
Kentucky	328	10	1,418	2.57
Louisiana	477	17	1,119	1.97
Maine	95	17	265	2.12
Maryland	668	18	2,212	2.08
Massachusetts	660	22	1,387	1.80
Michigan	1,052	16	2,902	2.11
Minnesota	567	17	2,267	2.37
Mississippi	299	18	629	1.90
Missouri	634	18	1,498	1.94
Montana	88	17	174	1.82
Nebraska	212	19	481	1.94
Nevada	318	22	894	1.70
New Hampshire	135	21	331	1.87
New Jersey	702	14	3,148	2.49
New Mexico	198	14	559	2.17
New York	1,784	10	7,932	2.67
North Carolina	970	21	2,575	1.75
North Dakota	55	16	154	2.26
Ohio	1,203	16	3,287	2.14

Oklahoma	328	21	780	1.87
Oregon	367	19	1,019	1.85
Pennsylvania	1,277	17	3,319	2.06
Rhode Island	114	18	285	1.99
South Carolina	442	17	1,075	1.88
South Dakota	77	16	211	2.10
Tennessee	669	21	1,325	1.66
Texas	2,928	20	7,671	1.81
Utah	393	22	1,069	1.89
Vermont	38	13	160	2.43
Virginia	847	24	1,957	1.76
Washington	673	22	1,888	1.84
West Virginia	120	11	303	2.12
Wisconsin	527	14	2,003	2.43
Wyoming	44	13	142	2.47

If the federal government refused to pay for a share of the program costs in proportion to the share of benefits received and only maintained its efforts, allowing states to apply federal savings in Head Start and special education to offset some of the costs of the program (redistributing federal Head Start commitments equitably among states and holding states harmless from potential losses of federal funds), the program would generate budget surpluses in 46 states by 2050.[3] Collectively, states would experience net budget savings in 23 years with an average return per state tax dollar expended on the program of $1.26 in 2050, but the returns per state tax dollar vary from a low of seventy-nine cents in Alabama to a high of $1.88 in New York in 2050. And, in 2050 the federal government would be enjoying $73 billion in budget surplus due to the pre-k investment made largely by states. Including the compensation and crime benefits of the program, the ratio of total state benefits to state program costs in 2050 varies from a minimum ratio of 5.9 to 1 in Alabama to 11.2 in Wyoming (see Table 6).[4]

[3] In such circumstance, states would pay 95% and the federal government would pay 5% of net program costs.

[4] The budget benefits, when states pay for most of the program, should perhaps be seen as bonuses that are in addition to the non-budgetary benefits, as the non-budgetary benefits are by themselves greater than the costs of the program. For example, by 2050, the increase in compensation is estimated to amount to 1.8% of the Gross Domestic product or $432 billion, which is more than four times the cost of the program.

Table 6: State-by-State Government Budget Effects of a State Funded Universal Program with Federal Maintenance of Effort

State	Years Before Annual Budget Benefits Exceed Annual Costs	State Government Surplus in 2050 (Millions of 2006 Dollars)	Ratio of State Government Budget Benefits to Program Costs in 2050	Ratio of Total State Benefits to State Program Costs in 2050	Federal Government Surplus in 2050 (Millions of 2006 Dollars)
National	23	23,053	1.26	7.9	72,552
Alabama	*	-241	0.79	5.9	760
Alaska	*	-34	0.88	7.7	240
Arizona	35	227	1.08	7.6	2,183
Arkansas	16	298	1.48	8.3	546
California	24	2,783	1.23	8.1	10,803
Colorado	24	408	1.27	9.3	1,341
Connecticut	20	366	1.42	8.7	794
Delaware	12	66	1.59	10.9	123
District of Columbia	18	95	1.36	7.8	217
Florida	20	1,876	1.32	7.2	4,381
Georgia	18	1,348	1.46	8.7	2,672
Hawaii	29	63	1.17	8.9	345
Idaho	29	68	1.14	8.5	400
Illinois	21	1,137	1.34	8.6	2,964
Indiana	*	-215	0.89	6.8	1,350
Iowa	27	113	1.17	8.2	554
Kansas	22	219	1.32	8.5	648
Kentucky	12	591	1.71	9.8	827
Louisiana	22	275	1.26	8.2	844
Maine	23	60	1.28	8.8	204
Maryland	23	537	1.28	8.4	1,675
Massachusetts	41	60	1.04	7.2	1,328
Michigan	21	805	1.33	7.8	2,097
Minnesota	19	782	1.51	9.9	1,485
Mississippi	28	82	1.13	8.3	546
Missouri	32	164	1.11	7.8	1,335
Montana	25	15	1.08	8.0	159
Nebraska	27	79	1.17	8.3	401
Nevada	41	36	1.03	7.5	858
New Hampshire	44	1	1.00	8.3	331
New Jersey	19	966	1.49	10.1	2,181
New Mexico	18	189	1.44	9.1	370
New York	11	3,882	1.88	9.1	4,050
North Carolina	32	413	1.13	6.7	2,162
North Dakota	19	46	1.41	10.1	108
Ohio	21	932	1.35	8.5	2,355
Oklahoma	35	82	1.10	8.5	698
Oregon	32	105	1.10	8.1	914

Pennsylvania	18	1,075	1.37	8.1	2,244
Rhode Island	23	71	1.27	7.7	214
South Carolina	26	204	1.18	7.3	871
South Dakota	22	44	1.26	8.8	166
Tennessee	41	63	1.03	6.2	1,263
Texas	34	694	1.08	7.8	6,976
Utah	35	125	1.11	8.6	944
Vermont	14	56	1.54	9.0	105
Virginia	*	-67	0.97	7.4	2,025
Washington	34	279	1.14	7.5	1,609
West Virginia	13	77	1.31	7.6	226
Wisconsin	17	773	1.59	9.3	1,230
Wyoming	14	47	1.54	11.2	94

* Program budget benefits do not exceed costs within the window of this analysis

Aside from budget, earnings, and crime benefits, there are other benefits from high-quality pre-K that we have not evaluated. There may have been costs that we have omitted from our analysis, as well. Some of these omitted costs and benefits are described in the next section.

Omitted costs and benefits of Targeted and Universal Prekindergarten:

The ultimate costs and benefits of a large-scale, nationwide pre-k program could turn out to be higher or lower than what we have estimated. For illustration purposes, this analysis assumes the launch of a pre-K program on a national scale immediately in 2007, with full phase-in by 2008. But, for practical purposes, a large-scale pre-K program would have to be phased in over a longer period. In general, extrapolating from a relatively small-scale program to a large- scale national program is precarious. There may be start-up costs or benefit reductions associated with the scaling up that have not been considered, such as the recruitment and training of teachers and staff and the finding of appropriate locations. The quality of teachers and staff may not be as good, or the teachers and staff may not be as highly motivated, as those in the Chicago CPC program. If the pre-k programs increase the number of high school graduates market wages for higher skilled labor may decline in response to the increased supply of high skilled workers.

On the other hand, the total benefits of pre-k investment are understated in our estimates and the omitted benefits probably far outweigh any omitted costs. For example, we may have omitted some of the value of the future greater productivity of more educated workers. To illustrate how large this omitted benefit may be consider that between 1973 and 2004 average compensation in the United States increased 46% while average productivity increased 76% (Mishel, Bernstein, and Allegretto 2006). Thus, the increase in compensation that we estimate will occur as a consequence of pre-k investment may reflect less than two-thirds of the increase in productivity that will take place in the economy. This implies that our estimates of the benefits of the targeted and universal programs in the year 2050 are missing over $75 billion and $215 billion, respectively, in productivity increases.

We have also not measured the financial savings to families who would place their children in the publicly funded program but whom, in its absence, would have paid the costs of private preschool. Since about one-quarter of all families with three- and four-year-old children place their children in private preschool programs, the savings to families from the use of publicly funded pre-k are potentially very large, especially for a universal program.

A large pre-k program would have the potential not possible in small programs to improve the school atmosphere for everyone, not just pre-K participants. Raising the academic performance while lowering the criminal activity of the 25% of children who attend high-quality targeted pre-k should benefit the other 75% of children who subsequently attend kindergarten through high school with them. This peer effect may be even greater for a universal program: the reductions in crime and school failure and the boosts to employment, productivity, and earnings may be reinforcing and could produce larger pre-k effects than those we have estimated. Hence, there may be multiplier effects on the economy from the higher skilled, more productive, and higher earning universal pre-K participants.

There is also evidence that a universal program may be more effective than we have estimated if it integrates children from different economic backgrounds more thoroughly than a targeted program

could. Schecter (2002) found that low-income children in economically integrated preschools fared better than comparable children in targeted programs that served only low-income children.

We do not calculate the potentially positive effects on the children born to pre-K participants who (as parents) will have higher earnings and employment and lower incarceration rates. Pre-k is an investment in the parents of the future who, as a result of pre-K education, will be able to provide better educational opportunities to their children than they would have without the pre-K program. Hence, the children of pre-k participants may be able to earn more and lead better lives. If this generational effect were accounted for, the benefits of pre-K may be substantially larger than those we have estimated.

Numerous other savings to taxpayers and boons to government budgets may have been omitted. For instance, there is evidence that high-quality pre-K may reduce smoking, which in turn, may reduce public health care expenditures (Schweinhart et al 2005),

Benefits were further underestimated as we limited ourselves to benefits for which it was possible to obtain monetary estimates. Thus, we left out benefits such as the intrinsic value of lower drug use, fewer teenage parents, and greater self-sufficiency when pre-k participants become adults. In total, the value of the omitted benefits are likely to swamp the value of the omitted costs, and the total benefits and the benefit-cost ratios of both the targeted and the universal programs are likely to be larger than those we have presented in this paper.

Difficulties in Estimating the Effects of Prospective Pre-k Programs:

To calculate the effects of a universal program we must estimate the extent to which the benefits of a high-quality, pre-k program like the Chicago CPC program, which served high-risk children (from low income families), would apply to medium-risk children (from middle income families) and low-risk children (from high income families) who would otherwise attend no preschool. The Chicago CPC program and studies of other high-quality programs found significant long-run benefits for high-risk

children, but most of these high-quality programs did not include children from middle and upper income families and thus they do not provide evidence of the long-term effects of high-quality pre-k participation on more advantaged children. Unfortunately, there are not many studies that have examined the benefits of high-quality prekindergarten on medium and low-risk children.

Differential pre-K benefits for children with different backgrounds manifest themselves in two ways. First, there is a baseline effect: different populations have different rates of everything from child abuse to special education to criminal behavior. This different baseline can be thought of as a "room for improvement" effect. Secondly, there may be a differential treatment effect: for reasons not captured fully by the baseline differences, different children may see greater or lesser treatment effects from prekindergarten.

It is reasonable to expect that the benefits of high-quality pre-k will be more positive for less advantaged children than they will be for more advantaged children because there is more room for improvement among poor children. The incidence of academic and social problems is generally higher for high-risk children than it is for more advantaged children. For example, middle and upper income children are retained at only about 72% and 50%, respectively, of the rate of poor children. Similarly, children from middle income and well-to-do families use special education at roughly 67% and 38%, respectively, the rate of low-income children (Karoly and Bigelow 2005). Likewise, poor children are disproportionately involved in crime and are more likely to be victims of child abuse and neglect than are non-poor children (Mocan et al 1999, Sedlak and Broadhurst 1996).

Collectively, these data suggest that high-quality pre-k programs may be able to generate smaller benefits from low-risk kids than from high-risk kids. For example, assuming for illustration purposes that the average low-risk child commits two crimes while the average high-risk child commits four crimes and that a pre-K program cuts crime rates in half for all children, then the criminal justice system will be spared the costs of only one crime per low-risk child but a greater two crimes per high-risk child

due to the pre-K program. This is the baseline effect: a higher starting point leaves less room for absolute improvement.

Aside from the fact that the room for improvement differs among children from various socio/economic backgrounds, the empirical research on the measured impacts of pre-k generally shows that lower, middle, and upper income children benefit from high-quality prekindergarten. But, the literature shows mixed findings on how much these groups of children benefit and on which of these groups of children benefits most.

Larsen and Robinson (1989) found significant gains for boys but not for girls from pre-k participation for children from above average income and educationally advantaged families.

Garces, Thomas and Currie (2000) found that high-risk children who attended Head Start had some gains relative to comparable children who attended no preschool. In contrast, lower risk children who attended preschool other than Head Start (mostly private preschools) had no significant gains relative to comparable children who attended no preschool.[5]

Analyses of Georgia's preschool programs (Henry et al 2003a and 2005) indicate that children from all economic backgrounds benefit from preschool. Specifically, children in Georgia attending preschool made significant gains from the beginning of preschool to the end of first grade on a variety of tests compared to national samples of children their age, of which only about two-thirds attended some preschool.

Evaluations of Oklahoma's universal pre-k program (Gormley and Gayer 2005, Gormley et al 2004) also indicate that children from all economic backgrounds benefit from pre-k. Poorer children tended to gain more than richer children but the differences in gains were not large. In addition, some of

[5] The lack of significant benefits from non-Head Start preschool for low risk kids that Graces, Thomas, and Currie (2000) found must be considered with caution because we have no data on the quality of the non-Head Start programs the children attended. If their findings for low-risk children reflect the relatively low quality of the private preschools they attended, then low-risk children moving from low-quality private preschools to high-quality public pre-k may get some, all, or nearly all of the benefits associated with a high-quality program.

the largest gains appear to have been experienced by lower middle income children. Also, it should be noted that the children who attended the state's universal pre-k were compared to children who had not attended the universal pre-k but who may have attended some other form of preschool. Thus, the gains that were measured reflect the benefits of attending a relatively high-quality public pre-k program compared to the gains of attending, on average, lower quality preschool or no preschool at all.

Studies in Canada and England also found that children who attended pre-k had better academic outcomes than children who did not attend preschool, regardless of their economic background (Lipps and Yipton-Avila 1999, Sammons et al 2002 and 2003). Likewise, a study of the French pre-k program (Hirsch 2004) found that children gain from attending additional years of pre-K and that these benefits are similar across income levels.

Barnett, Lamy and Jung (2005), in an analysis of kindergarten children in 5 states, found that one year of state funded, relatively high-quality, pre-k significantly raised test scores compared to children who did not attend the state funded program. They found a somewhat stronger effect of pre-k on the print awareness of low income children but the improvements in math and vocabulary tests were virtually identical for children from high and low income families. Note too, that many of the children in the comparison groups attended preschool programs other than the relatively high-quality state funded pre-k. Thus, this study also suggests that higher quality preschool programs provide benefits beyond those achieved by other preschool programs for children from all economic backgrounds.

In a nationwide analysis, Magnuson et al (2004b and 2005) found that children who attended preschool were better prepared and performed better in kindergarten than did students who did not attend preschool, regardless of economic background. However, they found that the greatest math and reading gains were achieved by the most disadvantaged children. On the other hand, the reduction in grade retention was roughly the same for high and non-high risk children. Magnuson et al (2004b) also provide estimates for the effects on reading and math skills of preschool participation relative to non-

participation for the full sample and a sub sample of children living in poverty which suggests that average risk kids may get anywhere from 60% to 95% of the benefits of preschool that are received by high risk kids.

Several points are clear. Children from poor, middle, and upper income families benefit from preschool. Higher quality pre-k provides greater benefits than lower quality preschool. Studies differ on the degree of impact that preschool has on children from different economic backgrounds. Some studies find that the positive effects of pre-k on children from more and less advantaged backgrounds are nearly identical. Other studies suggest that children from low income families gain more from pre-k than do children from middle and high income families.

Given the mixed results on the relative effects of preschool on children from different economic backgrounds, it is not certain to what extent the benefits of a high-quality, universal program modeled after the Chicago CPC program, that served high-risk children (from low income families), would apply to medium-risk children (from middle income families) and low-risk children (from high income families) who would otherwise attend no preschool. Thus, we offer high, low, and intermediate (or most likely) range estimates of these possible effects. Earlier in the paper the intermediate range estimates were used, but in a sensitivity analysis that follows the full range of effect estimates will be examined.

For the high end estimate we assume that the effects of pre-k are virtually identical for children of all economic backgrounds. Thus, we assume that all children in a universal, high-quality pre-k program who would otherwise have attended no preschool would get 100% of the pre-k effects measured in the Chicago CPC program. Moving from the baseline targeted-program-estimates to the universal-program-estimates, the costs and benefits are attenuated only to account for the lower incidence of academic and social problems experienced by middle and upper income children.

For our low end estimate we assume that children from middle income and wealthy families would experience much less improvement from pre-k than did the relatively disadvantaged children in

the Chicago CPC program. Thus, for the low estimate we assume that middle and upper income children (who would otherwise have attended no preschool) would experience on average only 70% and 40%, respectively, of the improvement observed in the Chicago CPC program.

Finally, for our intermediate estimate, we assume that children from middle income and wealthy families would experience somewhat lower benefits from pre-K than did the relatively disadvantaged children attending the Chicago CPC program. Thus, for the intermediate estimate we assume that middle and upper income children (who would otherwise have attended no preschool) receive on average only 85% and 70%, respectively, of the benefits estimated in the targeted prekindergarten program.

These attenuations are applied on top of adjustments for the baseline, or "room for improvement" effect, so the true attenuation for middle and upper income children is significantly higher. Thus, the estimating procedure calculates benefits of pre-k per mid and low risk children that are far less than eighty-five and seventy percent of those for high-risk children, as assumed in the intermediate estimate. For example, with the baseline adjustments, we assume that middle and upper income children (who would otherwise attend no preschool) receive on average only 49% and 40%, respectively, of the reduction in child maltreatment rates, 61% and 35%, respectively, of the reduction in retention, and 57% and 27%, respectively, of the reduction in special education experienced by relatively disadvantaged children.

Our intermediate estimate is consistent with the findings of Gormley et al (2004) with respect to the relative benefits of the Oklahoma pre-k program for low income children (those who qualified for free lunch) and financially advantaged children (those who paid full price for lunch).[6] Specifically, on tests of letter identification, spelling, and applied problems the relatively financially advantaged children experienced improvements that were 78%, 83%, and 64% as great as the improvements experienced by

[6] Our intermediate estimates are also reasonably consistent with the findings of Magnuson et al (2004), noted above, which suggest that average children who attend preschool may get anywhere from 60% to 95% of the benefits received by high risk children.

the relatively poor children. We based our most likely intermediate estimates in part on the Oklahoma results because the Oklahoma universal pre-k program, which serves most of the four-year-olds in the state, is similar to, although somewhat lower in quality than, the Chicago CPC program. In addition, its estimated initial effects on school readiness of high risk children are similar in size to those estimated for the initial effects of the Chicago CPC program on high risk children. Thus, for both reasons it may be reasonable to assume that the effects of the Oklahoma program on middle and upper income children will be similar to those of a Chicago CPC-style universal program on middle and upper income children. However, it should be noted that the children who attended Oklahoma's universal pre-k were compared to children who had not attended the universal pre-k but who may have attended some other form of preschool. Thus, the gains that were measured for the Oklahoma participants reflect the benefits of attending a relatively high-quality pre-k program compared to the gains of attending, on average, a combination of lower quality and no preschool at all. Since we are trying to measure the impact of a high quality pre-k program on middle and high income children who would otherwise attend no preschool, and given that middle and high income children who did not attend the Oklahoma program are more likely to have attended some other preschool, basing our estimate on the outcomes of the Oklahoma program may result in overly conservative estimates of the benefits for mid and low-risk children.

To calculate the benefits of targeted and universal pre-k we must also estimate the extent to which the benefits of a high-quality pre-K program like the Chicago CPC program, that compared outcomes for children who attended a high-quality pre-k program to outcomes for children who (for the most part) attended no preschool, will apply to children who would otherwise attend some form of preschool. In the United States, about half of 3 and 4-year-olds are already attending some form of preschool. Hence, if we were to create publicly funded, high-quality pre-k, it is probable that many of

the children who would attend such a program would have otherwise attended some form of preschool. As already noted, research suggests that many existing preschool programs provide benefits to participants relative to children who do not attend preschool. In addition, higher quality pre-k programs provide greater benefits than lower quality preschool programs (see Peisner-Feinberg et al 2001, National Institute of Child Health and Human Development 2005, and Henry et al 2003 and 2005). Hence, children moving from lower quality preschool to a higher-quality pre-k program should gain but not as much as children moving from no preschool to high-quality pre-k. Thus, the estimated positive effects of public, high-quality, pre-k must be attenuated to take into account that many of its prospective participants would attend some form of preschool and receive some of the benefits of pre-k in the absence of the public program.

Numerous studies of private preschool programs found their educational quality to be highly variable, often poor, and lower on average than the quality available in existing public programs (Ripple et al 1999, Smith et al 2003, Blau 2001, Currie 2001, Helburn and Bergmann 2002, Cost, Quality, and Child Outcomes Study 1995, and Phillips et al 1994, Henry et al 2003a and 2005). Magnuson et al (2004a, 2004b, 2005) reported that children in public pre-k had larger gains than children in all other forms of preschool. Some researchers have concluded that the quality of private preschools on average is so poor that they offer little or even no benefit to participants (Barnett et al, 2006).

There is some evidence of the effectiveness of existing public pre-k programs relative to high-quality pre-k programs. Barnett (2002 and 2005) found that the relatively lower quality programs achieved only about 25% of the reduction in special education and 55% of the reduction in grade repetition achieved by the higher quality programs. But, as Barnett noted, it may be misleading to compare these results as the higher quality programs were serving more disadvantaged children. Similarly, Barnett et al (2006) found that children attending Head Start experienced only 25% to 35% of the improvement in letter word identification and spelling that was experienced by poor and non-poor

children in the relatively higher quality Oklahoma universal pre-k program. However, it is not certain whether these differences in initial results will persist.

The bottom line is that there is little quantitative evidence to indicate exactly how much smaller the impacts of existing preschool programs would be compared to a prospective high-quality program. We assume that most existing preschool programs, whether private or public, provide benefits but are not of high-quality and as effective as the prospective high-quality pre-k programs proposed in this study. We provide a wide range of estimates of the effectiveness of the proposed programs relative to existing preschools: high, low, and intermediate (or most likely) estimates. In our estimates of the cost effectiveness of a high-quality, public pre-k presented in this paper, we used the intermediate estimate, but our sensitivity analysis performed later in the paper includes the full range of estimates.[7]

Our high estimate assumes that children attending high-quality public pre-k who would otherwise have attended some other preschool would receive about 90% of the benefits received by comparable participating children who would have otherwise attended no preschool. This implies that most existing preschool programs are of low quality and not generating many benefits.

At the other extreme, we assume that children who would otherwise have been enrolled in some form of preschool in the absence of a public program reap only 30% of the benefits of comparable children attending the public program who would have otherwise attended no preschool. This implies that existing preschool programs are fairly high-quality, generating a substantial portion of the benefits of the prospective high-quality public programs.

Finally, our intermediate estimate assumes that children who would have attended some other preschool in the absence of high-quality public pre-k would experience 60% of the effect experienced by comparable participating children who would otherwise have attended no preschool. This implies that

the prospective programs will be of greater quality than existing preschool programs and will generate improvements that are about two and a half times as large as those produced in the average existing preschool program. This estimate may be conservative as the initial effects of high-quality public pre-k programs on the school readiness of non-poor and poor children may be substantially more than two and a half times as large as the initial effects of medium quality public preschool programs (Barnett et al 2006).

In the next section, a sensitivity analysis is performed to demonstrate what effect various estimates of the impacts of high-quality pre-k on children of different socio/economic background and attenuation rates to account for current preschool attendance have on estimates of the cost effectiveness of high-quality public pre-k.

Sensitivity Analysis for Targeted and Universal Prekindergarten:

For the targeted program in the year 2050, when we allow participants who would have attended some other preschool program in the absence of the high-quality public program to experience as little as 30% and as much as 90% of the impacts experienced by the Chicago CPC participants, the annual budgetary surplus would range from $45 billion to $68 billion, the return per tax dollar invested would vary from $2.83 to $3.51, the increase in compensation would be between $132 billion and $179 billion, and the savings to individuals from less crime would vary from $65 billion to $89 billion.

Aside from accounting for current preschool enrollment, in a sensitivity analysis of the universal program we must consider that a large scale universal pre-K program would draw in children from middle and upper income families who are at lower risk for educational failure and other problems than those in the targeted program. Such kids might (or might not) experience smaller positive impacts from

[7] In our cost and benefit estimating procedure, when attenuating the potential benefits to account for prior preschool attendance we do not factor out the fact that 15% of the Chicago CPC program control group attended preschool. Thus our attenuation for prior preschool attendance may be too great.

pre-k than those in the targeted program. In the sensitivity analysis below, we examine the cost effectiveness of universal pre-K when we account for various impacts of current preschool enrollment, allow middle and upper income children to experience as much as 100% and as little as 70% and 40%, respectively, of the high-quality pre-K effects experienced by low income children, and adjust for socio/economic factors. [8]

Our lowest estimate of the effects of universal pre-K assumes that participants who would have attended some other preschool program in the absence of the high-quality program would experience only 30% of the impacts experienced by the Chicago CPC participants, and pre-K impacts on middle and upper income children are only 70% and 40%, respectively, of those for the Chicago CPC participants. Our highest estimate of the effects of universal pre-K assumes that participants who would have attended some other preschool program in the absence of the high-quality program would experience 90% of the impacts experienced by the Chicago CPC participants, and pre-K impacts on middle and upper income children are 100% of those for the Chicago CPC participants.

Our lowest and highest estimates of the effects of universal pre-K investment suggest that this investment would generate in 2050 a budgetary surplus of at least $45 billion and as much as $156 billion, a return per tax dollar invested of at least $1.50 and as much as $2.51, an increase in compensation of between $301 billion and $588 billion, and savings to individuals from less crime and child abuse that vary from a low of $109 billion to a high of $210 billion.

To appreciate how conservative the low end estimate is consider what it assumes about the benefits of high-quality public pre-k for middle and upper income children who, in its absence, would have attended some other form of preschool relative to the benefits experienced by the poor children

[8] In other sensitivity analyses, we also varied the prospective enrollment rate in the universal program from a high of 94% to a low of 68% compared to the 81% assumed in the estimates presented in this paper. High enrolment rates, by scaling both costs and benefits, produced somewhat larger estimates of budget surpluses, compensation increases, and crime savings. But, they also generated somewhat lower estimates of the ratio of budget benefits to budget costs. Low enrollment rates produced somewhat smaller estimates of budget surpluses, compensation increases, and crime savings. But, they also generated somewhat higher estimates of the ratio of budget benefits to budget costs.

who participated in the Chicago CPC program. With socio/economic baseline adjustments, treatment effect attenuations, and attenuations for prior preschool attendance, middle and upper income children would experience only 15% and 6%, respectively, of the grade retention benefit, 14% and 5%, respectively, of the reduction in special education, and 12% and 7%, respectively, of the reduction in child maltreatment.

In other words, even adjusting for a very wide range of estimates for the effects of current preschool participation and the impact of high-quality pre-k on children from different economic backgrounds, high quality universal pre-K has substantial long-run benefits for government budgets, the economy, and crime reduction. In addition, as noted above, the value of the omitted benefits is likely to greatly exceed the value of omitted costs. Thus, although the government budget benefit-cost ratio of a national scale pre-k program (whether targeted or universal) could be somewhat higher or lower than the preferred estimate presented in this paper, it is improbable that this ratio would be less than the 1 to 1 ratio necessary for the program to eventually pay for itself.

Implications for Policy:

The economic case for public investment in pre-k is compelling. Research demonstrates is that investment in high-quality pre-k, even when its benefits are not fully accounted for, is a cost effective public policy strategy for enriching children and the nation. A nation-wide commitment to high quality early childhood education would cost a significant amount of money upfront but it would have a substantial payoff in the future as such a program would ultimately reduce costs for remedial and special education, criminal justice, and child welfare, and it would increase income earned and taxes paid. Over time, governmental budget benefits alone outweigh the costs of high quality pre-k; that is, high-quality pre-k *pays for itself*! It is striking that a national program, either funded jointly by federal and state governments or financed largely by states, will have significant positive effects on the long-term budget

outlooks of both federal and state governments. Thus, a national pre-k initiative should be seen as a sound investment on the part of government that generates substantial long-term benefits.

A case for public investment in either a targeted or a universal pre-k program can be made with the best policy depending in part on whether a higher value is placed on the ratio of benefits to costs (which are higher for a targeted program) or the total net benefits (which are higher for a universal program). However, when policymakers weigh the benefits of investment in a targeted versus a universal program other criteria should be taken into consideration. For example, if public funds are limited a targeted program may be more attractive as it is less expensive to implement. Likewise, if a large priority is placed on narrowing the achievement gap between children from low-income and upper-income families, then the targeted program may be more effective in achieving this goal.

On the other hand, a universal program available to all children may garner greater public support and thus be more likely to achieve the high quality necessary for optimal results. Also, children who are not eligible for a targeted program can benefit from high-quality pre-K and targeted programs are likely to fail to reach many of the children they are designed to serve. A universal program not only benefits middle- and upper- income children but may also have larger effects than a targeted program for the most at-risk children. Given that the positive impacts of pre-k may be larger for at-risk than for more advantaged children, a pre-K program, whether targeted or universal, may help to reduce achievement gaps between poor and non-poor children and ultimately reduce income inequality nationwide.

References

Barnett, W. Steven. 1993. Benefit-cost analysis of preschool education: Findings from a 25-year follow-up. *American Journal of Orthopsychiatry*. Vol. 63, No. 4, pp. 500-8.

Barnett, W. Steven. 2002. *The Battle Over Head Start: What the Research Shows*. New Brunswick, N.J.: National Institute for Early Education Research.

Barnett, W. Steven. 2005. "Maximizing Returns from Prekindergarten Education." In *Federal Reserve Bank of Cleveland Research Conference: Education and Economic Development.* Cleveland, Ohio: Federal Reserve Bank of Cleveland. pp. 5-18.

Barnett, W. Steven, Debra J. Ackerman and Kenneth B. Robin. 2006. *California's Preschool for All Act (Proposition 82): A Policy Analysis*. New Brunswick, N.J.: National Institute for Early Education Research. May 18.

Barnett, W. Steven, Cynthia Lamy, and Kwanghee Jung. 2005. *The Effects of State Prekindergarten Programs on Young Children's School Readiness in Five States*. New Brunswick, N.J.: National Institute for Early Education Research. August.

Blau, David M. 2001. *The Child Care Problem: An Economic Analysis.* New York, N.Y.: Russell Sage Foundation.

Cost, Quality, and Child Outcomes Study Team. 1995. *Cost, Quality, and Child Outcomes in Child Care Centers.* 2nd edition. Denver, Colo.: University of Colorado Economics Department.

Currie, Janet. 2001. Early childhood education programs. *Journal of Economic Perspectives*. Vol. 15, No. 2, pp. 213-38.

Garces, Eliana, Duncan Thomas, and Janet Currie. 2000. *Longer Term Effects of Head Start*. Working Paper, series 00-20. Santa Monica, Calif.: Rand Corporation.

Gormley, William T. and Ted Gayer. 2005. Promoting school readiness in Oklahoma: An evaluation of Tulsa's pre-k program. *The Journal of Human Resources*. Vol. 40, No.3.

Gormley, William T., Ted Gayer, Deborah Phillips, and Brittany Dawson. 2004. *The Effects of Oklahoma's Universal Pre-Kindergarten Program on School Readiness*. Washington, D.C.: Center for Research on Children in the U.S. Georgetown University. http://www.crocus.georgetown.edu.

Helburn, Suzanne W., and Barbara R. Bergmann. 2002. *America's Child Care Problem: The Way Out*. New York, N.Y.: Palgrave.

Henry, Gary T., Craig S. Gordon, Laura W. Henderson, and Bentley D. Ponder. 2003a. *Georgia Pre-K Longitudinal Study: Final Report 1996–2001.* Atlanta, Ga.: Georgia State University, Andrew Young School of Policy Studies. May.

Henry, Gary T., Laura W. Henderson, Bentley D. Ponder, Craig S. Gordon, Andrew J. Mashburn, and Dana K. Rickman. 2003b. *Report of the Findings from the Early Childhood Study: 2001-02,* Atlanta, Ga.: Georgia State University, Andrew Young School of Policy Studies. August.

Henry, Gary T., Dana K Rickman, Bentley D. Ponder, Laura Henderson, Andrew Mashburn, and Craig S. Gordon. 2005. *The Georgia Early Childhood Study, 2001-2004: Final Report.* Atlanta, Ga.: Georgia State University, Andrew Young School of Policy Studies.

Hirsch Jr., E.D. 2004. *Equity Effects of Very Early Schooling in France*. Core Knowledge Preschool.http://www.coreknowledge.org/CKproto2/Preschool/FrenchEquity.htm.

Karoly, Lynn, and James H. Bigelow. 2005. *The Economics of Investing in Universal Preschool Education in California*. Santa Monica, CA: Rand Corporation.

Larsen, Jean M., and Clyde C. Robinson. 1989. Later effects of preschool on low-risk children. *Early Childhood Research Quarterly.* Vol. 4, pp. 133-44.

Lipps, G. and Yipton-Avila, J. 1999. *From Home to School: How Canadian Children Cope.* Culture, Tourism and the Center for Education Statistics. Ottawa, Ontario: Statistics Canada. Catalogue # 89F0117XIE.

Lynch, Robert G. 2004. *Exceptional Returns: Economic, Fiscal, and Social Benefits of Investment in Early Childhood Development.* Washington, D.C.: Economic Policy Institute.

Lynch, Robert G. 2007. *Enriching Children, Enriching the Nation: Public Investment in High-Quality Prekindergarten.* Washington, D.C.: Economic Policy Institute.

Magnuson, Katherine A., Marcia K. Meyers, Christopher J. Ruhm, and Jane Waldfogel. 2004a. Inequality in preschool education and school readiness. *American Educational Research Journal.* Vol. 41, No. 1, pp. 115–57.

Magnuson, Katherine A., Christopher J. Ruhm, and Jane Waldfogel. 2004b. *Does Prekindergarten Improve School Preparation and Performance?* NBER Working Paper 10452, Cambridge, Mass.: National Bureau of Economic Research. April.

Magnuson, Katherine A., Marcia K. Meyers, Christopher J. Ruhm, and Jane Waldfogel. 2005. Inequality in children's school readiness and public funding. *Focus.* Vol. 24, No. 1, pp. 12-18.

Masse, Leonard, and W. Steven Barnett. 2002. A Benefit Cost Analysis of the Abecedarian Early Childhood Intervention. New Brunswick, N.J.: National Institute for Early Education Research, Rutgers University.

Mishel, Lawrence, J. Bernstein, and S. Allegretto. 2006. *The State of Working America 2006/2007*. An Economic Policy Institute book, Ithaca, N.Y.: ILR Press, an imprint of Cornell University Press.

Mocan, H. Naci, and Daniel I. Rees. 1999. *Economic Conditions, Deterrence and Juvenile Crime: Evidence from Micro Data*. Working Paper #7405, Cambridge, MA: NBER.

National Institute for Child Health and Development. 2005. Early child care and children's development in the primary grades: Follow-up results from the NICHD study of early child care. *American Educational Research Journal*. Vol. 42, No.3, pp. 537-70.

Peisner-Feinberg, E.S., Burchinal, M.R., Clifford, R.M., Culkin, M.L., Howes, C., and Kagan, S.L. 2001. The relation of preschool child-care quality to children's cognitive and social development trajectories through second grade. *Child Development*. Vol. 72, pp. 1534-53.

Phillips, D. A., M. Voran, E. Kisker, C. Howes, and M. Whitebook. 1994. Child care for children in poverty: opportunity or inequity? *Child Development*. Vol. 65, pp. 472-92.

Reynolds, Arthur J. 2000. *Success in Early Intervention: The Chicago Child-Parent Centers.* Lincoln, Neb.: University of Nebraska Press.

Reynolds, Arthur, Judy Temple, Dylan Robertson, and Emily Mann. 2002. Age 21 cost-benefit analysis of the Title 1 Chicago Child-Parent Centers. *Educational Evaluation and Policy Analysis*. Vol. 24, No. 4, pp. 267-303. Winter.

Ripple, C., W. Gilliam, N. Chanana, and E. Zigler. 1999. Will fifty cooks spoil the broth? *American Psychologist.* Vol. 54, No. 5, pp. 327-43.

Rolnick, Art, and Rob Grunewald. 2003. Early childhood development: Economic development with a high public return. *Fedgazette*. Federal Reserve Bank of Minneapolis. March.

Sammons, P., K. Sylva, E. Melhuish, I. Siraj-Blatchford, B. Taggart, and K. Elliot. 2003. *Measuring the Impact of Preschool on Children's Social/Behavioral Development Over the Preschool Period*. Institute of Education Technical Paper 8b. London: University of London.

Schecter, C. 2002. *Language Growth in Low-Income Children in Economically Integrated Versus Segregated Preschool Programs.* West Hartford, Conn.: St. Joseph College.

Schweinhart, Lawrence J., Helen V. Barnes, and David P. Weikart, with W. Steven Barnett and Ann S. Epstein. 1993. *Significant Benefits: The High/Scope Perry Preschool Study Through Age 27.* Monograph No. 10. Ypsilanti, Mich.: High/Scope Educational Research Foundation.

Schweinhart, Lawrence J., Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive Belfield, and Milagros Nores. 2005. *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40,* Ypsilanti, Mich.: High/Scope Educational Research Foundation,

Sedlak, Andrea and Diane Broadhurst.1996. *The Third National Incidence Study of Child Abuse and Neglect (NIS-3)*. U.S. Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth and Families, National Center on Child Abuse and Neglect. Washington, D.C.: Government Printing Office.

Smith, T., A. Kleiner, B. Parsad, E. Ferris, B. and Greene. 2003. *Prekindergarten in U.S. Public Schools, 2000-2001: Statistical Analysis Report.* Washington, D.C.: National Center for Education Statistics. (NCES 2003-019).