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APPENDICES TO INCOME MAINTENANCE LAWS AND FERTILITY IN THE UNITED STATES

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ABSTRACT

The material contained in the following set of appendices is intended to supplement Institute Discussion Paper 117-72, "Income Maintenance Laws and Fertility in the United States."

Appendix A deals with the numbers of families that are likely to be eligible for coverage by income maintenance laws and the cash payments for which these families would be eligible. Appendix B shows schedules of benefit payments, earnings, and explicit and implicit tax rates for various income maintenance laws, with special reference to the Family Assistance Plan. Appendix C provides the background material, sources, and methodology for the estimates of the direct and indirect costs of raising a child. Appendix D discusses the relation between a decrease in the age of childbearing and the rate of population growth.

Appendix A

Detailed tables showing the numbers of families that are likely to be eligible for coverage by income maintenance laws and the payments to the families are included in Appendix A.

TABLE A-1

Women Aged 15-34 with No Children, by Marital Status and Poverty Status for the Noninstitutional Population in the U.S. in 1967

	Below Poverty Line[a]		Above Poverty Line
AGE GROUP	Women Ever Married with No Children Ever Born	Single Women	Women Ever Married with No Children Ever Born
15-19	86,900	1,083,000	410,300
20-24	60,700	200,000	1,350,000
25-29	17,900	66,000	b
30-34	15,600	39,000	b
TOTAL	181,100[c]	1,388,000[d]	1,761,100[e]

SOURCE: Table 7 in "Previous and Prospective Fertility, 1967" Current Population Reports. P-20, No. 211, Jan. 26, 1971, U.S. Bureau of the Census.

[a]The Poverty Line in 1967 was around $2000 for a two person family.

[b]Women 25 and over are unlikely to be in families earning less than $3720 (the breakeven point for FAP benefits if a child is present).

[c]Number of married women who are potential candidates for the $2000 FAP "first baby bonus." Of course, if the family had a child it would not receive the full $2000 unless it had no other income. Typically, the families would be eligible only for some portion of the $2000.

[d]Number of single women who are potential candidates for a marriage and the first baby born bonus of $2000 from FAP.

[e]Number of married women whose income might be below $3720, which would make them eligible for some amount of FAP benefits if they had a child.

TABLE A-2

Number of Families Below FAP Breakeven by Family Size and Income

Husband-Wife Families (in thousands)

Income Category	Family Size (Guarantee level in parentheses) 3 (2,000)	4 (2,400)	5 (2,800)	6 (3,100)	7+ * (3,400-3,600)
$ < 1000	47.9	42.9	24.1	19.4	11.5
1000 - 1499	29.9	33.0	18.8	12.2	12.2
1500 - 1999	53.9	29.6	20.6	9.2	12.8
2000 - 2499	89.9	54.3	29.4	6.8	20.0
2500 - 2999	77.8	47.7	27.9	19.0	27.3
3000 - 3499	113.8	97.5	44.1	29.3	48.3
3500 - 3999	44.8	87.1	59.0	44.7	59.8
4000 - 4999		80.1	148.5	109.2	131.5
5000 - 5999				54.4	149.3
6000 - 6999					3.8
Total Number of Families (2,087)	457.9	472.2	372.4	311.5	472.7
Total Number of People (10,539)	1373.7	1888.8	1862.0	1869.0	3545.3

Basis for calculating numbers of families and median income levels in the highest income brackets, within each family size group.

Family Size	Breakeven level	Fraction of Interval from Lower Class Boundary to Breakeven Level	Assumed Median
3	3720	220/500 = .44	3610
4	4320	320/1000 = .32	4160
5	4920	920/1000 = .92	4460
6	5370	370/1000 = .37	5185
7+	5820 (5 chd.) 6120 (6 chd.)		

*Assumes average size of all 7+ families is 7.5.

TABLE A-3

Average FAP Payments by Income Class and Family Size

Husband-Wife Families

Income Category (and assumed median)	Family Size (Guarantee level in parentheses) 3 ($2000)	4 ($2400)	5 ($2800)	6 ($3100)	7+ ($3500)*
$ < 1000 (800)	$1946.64	$2346.64	$2746.64	$3046.64	$3446.64
1000 - 1499 (1250)	1646.49	2046.49	2446.49	2746.49	3146.49
1500 - 1999 (1750)	1312.99	1712.99	2112.99	2412.99	2812.99
2000 - 2499 (2250)	979.49	1379.49	1779.49	2079.49	2479.49
2500 - 2999 (2750)	645.99	1045.99	1445.99	1745.99	2145.99
3000 - 3499 (3250)	312.49	712.49	1112.49	1412.49	1812.49
3500 - 3999 (3750)	72.37	378.99	778.99	1078.99	1478.99
4000 - 4999 (4500)		105.52	305.42	578.74	978.74
5000 - 5999 (5500)				122.00	311.74
6000 - 6999 (6500)					...

Payment formula: $P = G - 2/3\ (Y - 720)$, where Y = the assumed median for each income-family size class

Basis for calculating average FAP payment in the highest income brackets, within each family size

Family Size	Breakeven Level	Assumed Median
3	$3720	$3610
4	4320	4160
5	4920	4460
6	5370	5185
7+	5820 (5 chd.) 6120 (6 chd.)	

*Amounts are calculated on an assumed guarantee of $3500, representing an average family size of 7.5 for all 7+ families.

TABLE A-4

Total Payments to Families from FAP by Income and Family Size

Husband-Wife Families (in thousands)

[Product of cells in (Table A-2) x (Table A-3)]

Income Category	Family Size 3	4	5	6	7+
< 1000	$93,244	$100,671	$66,194	$59,105	$ 39,636
1000 - 1499	49,230	67,534	45,994	33,507	38,387
1500 - 1999	70,770	50,704	43,528	22,200	36,006
2000 - 2499	87,958	74,906	52,317	14,141	49,590
2500 - 2999	50,258	49,894	40,343	33,074	58,586
3000 - 3499	35,561	69,468	49,061	41,386	87,543
3500 - 3999	3,242	33,010	45,960	48,231	88,444
4000 - 4999		8,452	45,355	63,198	128,704
5000 - 5999				6,637	46,543
6000 - 6999					...
Total Cost	$390,263	$454,639	$388,752	$321,479	$573,439

($2,128,572)

TABLE A-5

Number of Families Below the Generous IML's Breakeven Level by Family Size and Income

Husband-Wife Families (in thousands)

Income Category	Family Size (Guarantee level in parentheses) 3 ($2350)	4 ($3000)	5 ($3650)	6 ($4150)	7+* ($4650-$5550)
$ < 1000	47.9	42.9	24.1	19.4	11.5
1000 - 1499	29.9	33.0	18.8	12.2	12.2
1500 - 1999	53.9	29.6	20.6	9.2	12.8
2000 - 2499	89.8	54.3	29.4	6.8	20.0
2500 - 2999	77.8	47.7	27.9	19.0	27.3
3000 - 3499	113.8	97.5	44.1	29.3	48.3
3500 - 3999	101.8	87.1	59.0	44.7	59.8
4000 - 4999	222.2	250.2	161.4	109.2	131.5
5000 - 5999		386.2	249.9	146.9	149.3
6000 - 6999			338.1	173.0	187.5
7000 - 7999			133.1	227.9	206.2
8000 - 8999				70.4	201.9
9000 - 9999					95.0
Total Number of Families (4,974)	737.1	1028.5	1106.4	860.0	1163.3
Total Number of People (26,215)	2211.3	4114.0	5532.0	5630.4	8724.8

Basis for calculating numbers of families and median income levels in the highest income brackets, within each family size group.

Family Size	Breakeven Level	Fraction of Interval from Lower Class Boundary to Breakeven Level	Assumed Median
3	$4700	.70	4350
4	6000	1.00	5500
5	7300	.30	7150
6	8300	.30	8150
7 +	9300 (5 chd.)		
	10100 (6 chd.)		
	10700 (7 chd.)		
	11100 (8 chd.)		9500

* Assumes average size of all 7+ families is 7.5.
Assumed average breakeven = $9500.

TABLE A-6

The Generous IML Payments by Income Class and Family Size

Income Category (and Assumed Median)	Family Size (Guarantee level in parentheses) 3 ($2350)	4 ($3000)	5 ($3650)	6 ($4150)	7+ ($4850)*
$ < 1000 (800)	$1950	$2600	$3250	$3750	$4450
1000 - 1499 (1250)	1725	2375	3025	3525	4225
1500 - 1999 (1750)	1475	2125	2775	3275	3975
2000 - 2499 (2250)	1225	1875	2525	3025	3725
2500 - 2999 (2750)	975	1625	2275	2775	3475
3000 - 3499 (3250)	725	1375	2025	2525	3225
3500 - 3999 (3750)	475	1125	1775	2275	2975
4000 - 4999 (4500)	175	750	1400	1900	2600
5000 - 5999 (5500)		250	900	1400	2100
6000 - 6999 (6500)			400	900	1600
7000 - 7999 (7500)			75	400	1100
8000 - 8999 (8500)				75	600
9000 - 9999 (9500)					100

Payments Formula: $P = G - 1/2\ (Y)$ where Y = the assumed median for each income-family size class.

Basis for calculating average FAP payment in the highest income brackets, within each family size.

Family Size	Breakeven Level	Assumed Median
3	$4700	4350
4	6000	5500
5	7300	7150
6	8300	8150
7+	9300 (5 chd.)	
	10100 (6 chd.)	
	10700 (7 chd.)	
	11100 (8 chd.)	9500

*Amounts are calculated on an assumed guarantee of $4950, representing an average size of 7.5 for all 7+ families.

TABLE A-7

Total Payments to Families from High Level ($850/adult, $650/child) $3,000/family of 4

Husband-Wife Families (in thousands)

[Product of cells in (Table A-5) x (Table A-6)]

Income Category	Family Size 3	4	5	6	7+
$ < 1000	$ 93,405	$111,540	$ 78,325	$ 72,750	$ 51,175
1000 - 1499	51,578	78,375	56,870	43,005	51,545
1500 - 1999	79,502	62,900	57,165	30,130	50,880
2000 - 2499	110,005	101,812	74,235	20,570	65,500
2500 - 2999	75,855	77,512	63,472	52,725	94,868
3000 - 3499	82,505	134,062	89,302	73,983	155,768
3500 - 3999	48,355	97,988	104,725	101,693	177,905
4000 - 4999	38,885	187,650	225,960	207,480	341,900
5000 - 5999		96,550	224,910	205,660	313,500
6000 - 6999			135,240	155,700	300,000
7000 - 7999			9,982	91,160	226,820
8000 - 8999				5,280	121,140
9000 - 9999					9,500
Total Cost = $5,699,302	$580,090	$948,389	$1,120,186	$1,060,136	$1,960,501

TABLE A-8

Number of Families Below FAP Breakeven Level by Family Size and Income
One Adult, Female-Headed Families (in thousands)

Income Category	Family Size (in thousands) (Guarantee in parentheses) 2 ($1200)	3 ($1600)	4 ($2000)	5+* ($2300-2800)
$ < 1000	94.8	84.3	52.7	57.6
1000 - 1499	73.0	46.8	29.3	40.7
1400 - 1999	77.7	59.4	38.0	57.7
2000 - 2499	59.0	105.0	54.4	51.8
2500 - 2999	2.2	81.6	34.8	60.2
3000 - 3499		14.5	56.8	87.4
3500 - 3999			19.4	73.6
4000 - 4999				38.6
Total of Families 1,451	306.7	391.6	285.4	467.6
Total of People 5,739	613.4	1,174.8	1,141.6	2,805.6

Basis for calculating numbers of families and median income level in the highest income brackets, within each family size group.

Family Size	Breakeven Level	Fraction of Interval from Lower Class Boundary to Breakeven Level	Assumed Median
2	$2520	.04	2510
3	3120	.24	3060
4	3720	.44	3360
5+	4170 (4 chd.)	.32*	
	4620 (5 chd.)		
	4920 (6 chd.)		4160

*Assumes the mean for all 5+ families is 6 people.
Assumed breakeven point is $4320, which is 32% of the interval.

TABLE A-9

Payments by Income Class and Family Size. One Adult-Female-Headed

Income Category (and Assumed Median)	Family Size (Guarantee in Parentheses) 2 ($1200)	3 ($1600)	4 ($2000)	5+* ($2300-$2800)
1 - 1000 (800)	$1146.64	$1546.64	$1946.64	$2546.64
1000 - 1499 (1250)	846.49	1246.49	1646.49	2246.49
1500 - 1999 (1750)	512.99	912.99	1312.99	1912.99
2000 - 2499 (2250)	179.49	579.49	979.49	1539.49
2500 - 2999 (2750)	6.07	245.99	645.99	1245.99
3000 - 3499 (3250)		39.22	312.49	912.49
3500 - 3999 (3750)			72.37	578.99
4000 - 4999 (4500)				305.52

Payments Formula: $P = G - .667(Y-720)$ where Y = assumed median for each income-family size class

Basis for calculating average FAP payment in the highest income brackets, within each family size.

Family Size	Breakeven Level	Assumed Median
2	$2520	$2510
3	3120	3060
4	3720	3610
5+	4170 (4 chd.)	
	4620 (5 chd.)	
	4920 (6 chd.)	4160

*Assumed guarantee level is $2600 for a female headed family with 5 children. Assumed breakeven point for 4 is $4320 and assumed median income is $4160.

TABLE A-10

Total Payments to Families from FAP by Income and Family Size (in thousands of $). Female-Headed Households.

[Product of cells in (Table A-8) x (Table A-9)]

Income Category	Family Size 2	3	4	5+
$ 1 - 1000	$108,701	$130,382	$102,588	$146,686
1000 - 1499	61,794	58,336	48,242	91,432
1500 - 1999	39,859	54,232	49,894	110,380
2000 - 2499	10,590	60,846	53,284	79,746
2500 - 2999	13	20,073	22,480	75,009
3000 - 3499		569	17,749	79,752
3500 - 3999			1,404	42,614
4000 - 4999				11,793
Total Cost (1,478,448)	$220,957	$324,438	$295,641	$637,412

TABLE A-11

Number of Families Below the Generous IML's Breakeven Point by Family Size and Income. One Adult. Female-Headed Families (in thousands)

Income Category	Family Size (Guarantee in parentheses) 2 ($1500)	3 ($2150)	4 ($2800)	5+* ($3300-$4700)
1 - 1000	94.8	84.3	52.7	57.6
1000 - 1499	73.0	46.8	29.3	40.7
1500 - 1999	77.7	59.4	38.0	57.7
2000 - 2499	59.0	105.0	54.4	51.8
2500 - 2999	54.4	81.6	34.8	60.2
3000 - 3499		60.4	56.8	87.4
3500 - 3999		57.5	44.0	73.6
4000 - 4999		30.7	88.6	120.8
5000 - 5999			33.3	101.8
6000 - 6999				61.2
Total Number of Families 2,029	358.9	525.7	431.9	712.8
Total Number of Persons 8,299	717.8	1,577.1	1,727.6	4,276.8

Basis for calculating numbers of families and median income levels in the highest income brackets, within each family size group.

Family Size	Breakeven Level	Fraction of Interval from Lower Class Boundary to Breakeven Level	Assumed Median
2	$3000	1.00	4350
3	4300	.30	5500
4	5600	.60	7150
5+	6600 (4 chd.)		8150
	7600 (5 chd.)		
	8400 (6 chd.)		
	9000 (7 chd.)		
	9400 (8 chd.)		9500

*Assumes average size of all 5+ families to be 6. The breakeven level of income is assumed to average $7000.
Assumed breakeven point is $7000, or 100% of the interval; the median is assumed to be $6500.

TABLE A-12

Generous IML Payments by Income Class and Family. One Adult Families with Female Head

Income Category (and Assumed Median)	Family Size (Guarantee in Parentheses) 2 ($1500)	3 ($2150)	4 ($2800)	5+ ($3800)
$ 1 - 1000 (800)	1100	1750	2400	3400
1000 - 1499 (1250)	875	1525	2175	3175
1500 - 1999 (1750)	625	1275	1925	2975
2000 - 2499 (2250)	375	1025	1675	2675
2500 - 2999 (2750)	125	775	1425	2425
3000 - 3499 (3250)		525	1175	2175
3500 - 3999 (3750)		275	925	1925
4000 - 4999 (4500)		75	550	1550
5000 - 5999 (5500)			150	1050
6000 - 6999 (6500)				50
7000 - 7999 (7500)				
8000 - 8999 (8500)				
9000 - 9999 (9500)				

Payment Formula: P = G - 1/2 (Y)

Basis for calculating average FAP payment in the highest income brackets, within each famiy size.

Family Size	Breakeven Level	Assumed Median
2	$3000	$2750
3	4300	4150
4	5600	5300
5+	6600 (4 chd.)	
	7600 (5 chd.)	
	8400 (6 chd.)	
	9000 (7 chd.)	
	9400 (8 chd.)	7500

*Assume guarantee level is $3800 for a family with 5 children. Assumed breakeven point is $7000 and assumed median is $7500.

TABLE A-13

Total Payments to Families from Generous IML Payments. Female-Headed Households (in thousands)

[Product of cells of (Table A-12) x (A-11)]

Income Category	Family Size 2	3	4	5+
$ 1 - 1000	$104,280	$147,525	$126,480	$195,840
1000 - 1499	63,875	71,370	63,728	129,223
1500 - 1999	48,562	75,735	73,150	171,658
2000 - 2499	22,125	107,625	91,120	138,565
2500 - 2999	6,800	63,240	49,590	145,985
3000 - 3499		31,710	66,740	190,095
3500 - 3999		15,812	40,700	141,680
4000 - 4999		2,302	48,730	187,240
5000 - 5999			4,985	106,890
6000 - 6999				3,060
Total Costs ($2,736,460)	$245,642	$515,319	$565,233	$1,410,236

Appendix B

Schedules of Benefit Payments, Earnings, and Explicit Tax Rates for FAP and the Generous IML

In each of the Tables, B-1 to B-3, the first column shows various amounts of income that a family of four might earn, from zero up to the breakeven point when the IML payments (or IML-related subsidies) become zero. Associated with each level of earnings are: (1) the social security tax; (2) the positive income tax (if any); and amount of (3) IML benefits; and (4) medical insurance benefits. Table B-3 has additional benefits in the form of child care subsidies and also shows some state related taxes and benefits. Medical insurance benefits are shown in every table. They are integrated into the schedules on the assumption that either "Medicaid" or some subsitute medical insurance system will be part of an overall IML.

The plan in Table B-1 illustrates FAP as it was proposed in the "June (1970) Revision," then H.R. 16311. Table B-2 shows a modification incorporating the higher payments and lower tax rates of the Generous IML. Table B-3 is a modification of FAP which includes a child care subsidy. The tables are designed to show the decline in benefits as income rises and how these implicit taxes combine with the explicit taxes. The family's net income is calculated as the sum of earnings plus benefits, minus the explicit taxes. By comparing the change in net income with the change in earnings, one can calculate the implicit marginal tax on the change in earnings. For example, if earnings increase by $100 and the net "take home" income (including the income-in-kind benefits) increase by only $30, then the marginal tax rate is 70 percent over that income range.

Any additional subsidy to an IML, whether child care, Medicare, housing allowances, or other, has the effect of either raising tax rates or raising the breakeven level or both. Table B-3 brings this point out by illustrating how child care subsidies might be provided. (The table was designed for a specific illustration in the state of Vermont, as part of an HEW sponsored research project carried out by Mathematica, and the full report may be obtained from: Mathematica, Inc., 120 S. Alexander Street, Princeton, N.J., 08540.) The particular schedule of child care subsidies and fees was suggested by the Department of HEW. It has the feature that fees are kept nominal at low levels of income and become progressive as family income rises above about $4500 per year (for a family of four). This results in a high breakeven level of income; subsidies continue until family income reaches around $10,000. Thus, many families would be brought under coverage of the IML and would face relatively high tax rates on earnings--around 50 percent.

Some special features of Table B-3 apply specifically to Vermont, such as the state income tax and a sales tax allowance which declines as income rises. Although these features could have been eliminated from the table for this appendix, they were left in to indicate how any particular state fiscal program would (or might) mesh into the IML and how it affects the benefits and taxes according to income levels.

TABLE B-1

For FAP: Relationships Among Earnings, Taxes, Transfer Payments, and Implicit Tax Rates: Four Person Families Not Covered by an Existing Welfare Plan with Higher Benefits

A Gross Earnings	B Social Security Tax (5.2% of A)	C Positive Federal Income Tax[a]	D FAP Payment [2400 - 2/3 (A - 720)]	E Gross Money Income (A+D)	F Medical Insurance[b]	G Total (Net) Income (A-B-C+D+F)	ΔA Change in Gross Earnings	ΔG Change in Total Earnings	H Marginal Tax Rate
0	0	0	2400	2400	460	2860	720	640	11%
720	37	0	2400	3120	418	3501	880	218	75%
1600	83	0	1813	3413	389	3719	900	223	75%
2500	130	0	1213	3713	359	3942	500	124	75%
3000	156	0	880	3880	342	4066	800	197	75%
3800	198	0	346	4146	315	4263	520	57	89%
4320	225	73	0	4320	298	4320	180	128	29%
4500	234	98	0	4500	280	4448	300	167	44%
4800	250	140	0	4800	205	4615	820	450	45%
5620	292	263	0	5620	0	5065			

[a]At an earnings level of $38,000, the head of a family of four will begin to pay positive income taxes, assuming that a family head may claim a $700 exemption for each family member, and a $1,000 standard deduction. (These assumptions approximate how the new tax law amendments will affect low-income families.) The tax amounts are 14% of the first $1,000 in excess of $3,800; $140 plus 15% of the first $1,000 in excess of $4,800; and $290 plus 16% of the first $1,000 in excess of $5,800.

[b]Medical insurance has a basic premium value of $500. The contribution schedule of the FAP recipient is: 0% of gross income (column E) to $1,600; 5% of E from $1,600 to $3,000; 10% of E from $3,000 to $4,500; and 25% of E from $4,500 to $5,620.

$$
\begin{aligned}
0 < E < 1{,}600 \quad & F = 500 \\
1{,}600 < E < 3{,}000 \quad & F = 500 - 5\% \ (E - 1{,}600) \\
3{,}000 < E < 4{,}500 \quad & F = 500 - 70 - 10\% \ (E - 3{,}000) \\
4{,}500 < E < 5{,}620 \quad & F = 500 - 220 - 25\% \ (E - 4{,}500)
\end{aligned}
$$

TABLE B-2

For Generous IML: Relationships Among Earnings, Taxes, Transfer Payments, and Implicit Tax Rates: Four-Person Families Not Covered by an Existing Welfare Plan with Higher Benefits

A	B	C	D	E	F	ΔA	ΔF	G
$0	$0	$0	$3000	$430	$3430	$720	$287	60%
720	37	0	2640	394	3717	880	350	60%
1600	83	0	2200	350	4067	900	358	60%
2500	130	0	1750	305	4425	500	199	60%
3000	156	0	1500	280	4624	800	258	68%
3800	198	0	1100	180	4882	1000	183	72%
4800	250	140	600	55	5065	820	180	78%
5620	292	263	190	0	5245	380	121	68%
6000	312	322	0	0	5366			

A = Gross earnings

B = Social Security Tax (5.2% x A)

C = Federal Income Tax when A = $3800 to $4800 .14 (A - 3800)
when A = 4800 to 5800 .15 (A - 4800) + 140
when A = 5800 to 6800 .16 (A - 5800) + 290

D = IML payment = 3000 - 1/2 A

E = Medical Insurance when A + D = $0 to $1600: E = 500
when A + D = 1600 to 3000: E = 500 - .05 (A + D - 1600)
when A + D = 3000 to 4500: E = 500 - 70 - .10 (A + D - 3000)
when A + D = 4500 to 5620: E = 500 - 220 - .25 (A + D - 4500)

F = Total (Net) Income = A-B-C+D+E

ΔA = Change in gross earnings

ΔF = Change in total (net) income

G = Marginal tax rate = 1 - (ΔF/ΔA)

TABLE B-3

Relationship Between Earnings, FAP Payments, and Marginal Tax Rates for Families of Size Four: Vermont. (The Value of Day Care is Assumed to Equal $1200.) Child Care Fees are According to an HEW Recommended Plan

Gross Earnings	Soc. Sec. Tax	Fed. Income Tax	State Income Tax	FAP Payment	Gross Money Income	Medical Insurance	Sales Tax Allow-ance	Day Care Fee	Total Income	Marginal Tax Rate (in %)
A	B	C	D	E	F	G	H	I	J	K
0	0	0	0	2400	2400	460	34	0	4094	<> 18.5
720	37	0	0	2400	3120	418	30	50	4681	> 75.4
1000	52	0	0	2213	3213	409	30	50	4750	> 75.0
1600	83	0	0	1814	3414	389	30	50	4900	> 75.3
3000	156	0	0	880	3880	342	30	50	5246	> 79.1
4000	208	28	7	213	4213	309	26	50	5455	> 93.1
4320	225	73	19	0	4320	298	26	50	5477	> 32.8
4500	234	98	26	0	4500	280	26	50	5598	> 51.7
4800	250	140	37	0	4800	205	26	61	5743	> 56.0
5000	260	170	45	0	5000	155	22	71	5831	> 56.7
5620	292	263	70	0	5620	0	22	117	6100	> 32.8
5920	412	643	135	0	6920	0	0	350	6805	> 52.5
7920	412	643	185	0	7920	0	0	600	7280	> 59.5
8920	463	833	239	0	8920	0	0	900[a]	7685	> 55.0
9920	516	1023	294	0	9920	0	0	1200[b]	8135	

(Column explanations on next page.)

Explanations of Column Figures in Table B.3

B = 5.2% (A)

C = .14 (A - $3800) when A = $3800 to 4800
C = 140 + .15 (A - 4800) when A = 4800 to 5800
C = 290 + .16(A-5800) when A = 5800 to 6800
and so on.

D = (.2765) (C) For Vermont in 1970

E = $2400 - 2/3 (A - $720)

F = A + E

G = $500 - .05 (F-$1600) when F = $1600 to 3000
G = 500 - 70 - .10 (F-3000) when F = 3000 to 4500
G = 500 - 220 - .25 (F-4500) when F = 4500 to 5620

H = $42 when F = $0 to 999
38 when F = 1000 to 1999
34 when F = 2000 to 2999
and so on.
0 when F ≥ 6000

I = $ 0 when A = $0 to 720
50 when A = 720 to 4580
50 + .05 (A-4580) when A = 4580 to 5520
117 + .20 (A-5620) when A = 5620 to 7920
600 + .30 (A-7920) when A ≥ 7920

J = A + E + G + H - B - C - D - I + 1200 where $1200 = the value of day care services

$$K = 1 - \frac{\Delta J}{\Delta A}$$

Appendix C

Direct Costs. The figures for the direct costs of raising a child are taken from the paper, "Costs of Children," by Ritchie Reed and Susan McIntosh of the staff of the Commission on Population Growth. The basic source of the data underlying the calculations in this paper is the expenditure surveys of the U.S. Department of Agriculture. The cost calculation used in the text is based on the "low-cost level" for urban families. The annual average amount of expenditures for a child, according to the age of the child, is presented in Table C-1.

The discounted amount of average costs used in the text is $12,000, which is just a rounding of the reported $11,756. In another table, Reed and McIntosh report the undiscounted marginal costs of raising a third child for urban families on a low-cost level for two regions, South and North Central. The average for these two regions is around $14,500--obtained by weighting the amount for the South by 40 percent and the amount for the North Central region by 60 percent, on the assumption that the East and West are more similar to the North Central region. Noting that the ratio of the discounted average costs to the undiscounted average costs is .54 $\left(= \frac{\$11,635}{\$21,540}\right)$, we can approximate the discounted marginal costs of the third child as .54 X $14,500 = (approximately) $8,000.

The expenditures are for the following types of goods and services: food, clothing, personal care, obstetrical, housing, transportation, medical, educational and other. A listing of the amounts of these expenditures per category and per year (or age of the child) is shown in the appendix of:

TABLE C-1

Cost of Raising a Child at 1969 Prices, U.S. Average for Low-Cost Level for Urban Families

Age of Child	Expenditure	Age of Child	Expenditure
under 1	$1070	9	$1170
1	1110	10	1220
2	1060	11	1220
3	1060	12	1290
4	1090	13	1320
5	1090	14	1320
6	1120	15	1320
7	1170	16	1440
8	1170	17	1440

Source: "Costs of a Child," Commission on Population Growth, (Washington, D.C. 1971.)

Undiscounted total = $21,630

Discounted total = 11,756 (discounted at 8 percent)

Glen G. Cain, "Issues in the Economics of a Population Policy for the United States," Institute Discussion Paper 88-71. (The paper, without the appendix, is published in the American Economic Review, May, 1971.)

The direct costs of a child as reported by Cain were based on the research study by Sara A. Sohn ("The Cost of Raising a Child," Institute of Life Insurance, 277 Park Avenue, New York, N. Y. 10017), which draws upon six budget studies using data from: (a) the 1960-61 Survey of Consumer Expenditures of the U.S. Department of Labor; (b) several budget standards established by the Bureau of Labor Statistics, which were published in 1970; (c) the Annual Price Survey--Family Budget Costs, October, 1968, published by the Community Council of Greater New York; and (d) the "Cost of Raising a Child," a talk by Jean Pennock of the Agricultural Research Service, U.S. Department of Agriculture. Source (d) provided the basic data for the Reed-McIntosh study. As reported by Sohn and by Cain the costs calculations apply to a medium level budget, rather than the low level budget used in the text, and are average costs of a child--not marginal costs. Cain also computed the costs of a child with some allowance for the expenses of attending a college. The costs reported by Cain were $13,300 for a child without college expenses and $13,750 if college expenses are included. The expense of a college education was calculated as an expected value, wherein it was assumed that the probability that a child in an average family would attend college was one-half. Thus, the actual present value of the expenses borne by parents were divided by one-half to measure their expected present value. (Note that the use of an 8 percent discount rate reduces the impact of college expenses, since

the latter are assumed to occur 18 to 22 years hence.) These amounts are not much larger than the $11,756 amount computed by Reed and McIntosh, and the various studies together reveal that the final amounts arrived at are not too sensitive to many of the underlying assumptions and data sources.

2. Indirect Costs--Opportunity Costs of Market Work and Leisure Foregone by a Wife Because of the Birth of a Child

Wage Rate. The value of an hour of market work is assumed to be the wage a women would receive if she worked at a full-time job. In 1969 the median annual earnings of women who worked year-round at full-time jobs was $4,977 (Current Population Reports, Series P-60, No. 75, December 14, 1970.) This amounts to roughly $2.49 per hour for a work year of 2,000 hours (40 hours per week for 50 weeks). If the average number of hours worked per week was 38, the average would be $2.62. Let us assume that the wage for women who do bear children would on the average be somewhat lower, say $2.25 per hour, if these women did not bear children and were able to work full- or part-time instead. A lower wage reflects the probable fact that those who choose to work full-time have a higher earnings capacity than have all married women.

Hours Worked in the Market. The procedure for estimating the hours of market work foregone by a mother is to determine the observed difference between hours worked per year for a mother with a youngest child of different ages, and to compare this amount of hours worked with that of a woman who has either no children under 14 years of age (for one comparison) or one less child (in a second comparison).

Comparison 1: Indirect costs of having any children under 14 years of age compared with having no children under 14.

I assume that only children under 14 affect (i.e., reduce) the market work by a woman and that the number of her children is irrelevant--only the age of her youngest child affects labor market behavior. This last assumption is artificial, and relaxed for one special (but fairly typical) case below in Comparison 2.

The data on hours worked per year is obtained from the comprehensive study of labor force participation by William G. Bowen and T. A. Finegan, (The Economics of Labor Force Participation, Princeton: Princeton University Press, 1968.) The data refer to 1960, but updating the hours worked figures to 1969 would not much change the differentials between wives with and without young children. My procedure will be to use the Bowen-Finegan labor force participation rates which are: (1) adjusted for the effects of color, age, schooling, other family income, and employment status of the husband; and (2) adjusted to translate less than 40 hours per week of work as an equivalent lower labor-force participation rate.

For married women aged 14-54 in urban areas, with no children under 14 year of age, the "adjusted full-time equivalent labor-force participation rate" was 51 percent (using a weighted average of the rates for wives with children 14-17 only and wives with no children under 18). [Bowen-Finegan, p. 101]. A labor-force participation rate of 50 percent translates to about 1,000 hours of work per year (out of 2,000).

Wives with children under age 6 only have adjusted, full-time equivalent labor-force participation rate of 11 percent; and wives with children aged 6-13 only have a rate of 31 percent. (The rates for wives with children in these ages and in other ages as well--e.g., under 6 and 6-13, etc.--are

between 11 and 31 percent, and these rates are ignored in the calculations below.) Rates of 11 and 31 percent are equivalent to 220 and 620 hours of work per year, respectively.

A second step in the calculation of the age-of-child/hours-of-work relationship is to distribute the 11 percent rate for mothers of children under 6 to mothers with children of specific ages. A table on page 102 of Bowen-Finegan provides the necessary information. The ratio of adjusted labor-force participation rates of women with children at each single-year age under 6 ($LFPR_i$) to the average adjusted LFPR ($\overline{LFPR}$) of women with children under 6 is as follows:

Age of Child	Ratio ($LFPR_i/\overline{LFPR}$)	Adjustment in Hours Worked (The average hours worked is 220.)
< 1	.483	106
1	.866	191
2	.995	219
3	1.078	237
4	1.267	279
5	1.313	289

For simplicity no adjustment was made in the hours of work for mothers with children aged 6-13 to take account of the differential LFPR's by single year of age, since this adjustment was not measured in the Bowen and Finegan study.

The hours worked per year for women by age of child is shown in column 2 of Table C-2. This amount is subtracted from 1,000 hours--the

amount assumed to be worked by wives with no young children--and the difference is shown in column 3. The dollars foregone is column 3 X $2.25. The present value of the dollar amounts is calculated using a 7 percent discount rate--which is derived from an 8 percent "true" discount rate for the household and a 1 percent growth rate in wages. The present value of the stream of market earnings foregone is shown to be $11,743.

Hours of Additional Child-Care Homework for Mothers. Several arbitrary assumptions were made to measure the costs in leisure foregone because of child-related homework. The hours spent at such homework were assumed to be 14 per week for children aged 0-3, 10 hours per week for children 4-6, and 5 hours thereafter until the children were 14 years of age. Note that these figures do not purport to measure the time a mother spends with her child (most of which is a form of leisure) but rather the homework component of this time--changing diapers, cleaning clothes, etc. Even limited to this concept, the number of hours appears conservatively low. With this conservation in mind, I assume that there are no economies or diseconomies of scale over the relevant range of numbers of children. Thus, the same measure of leisure time foregone to homework is used in the costs of a third child computed in the last section of this appendix.

The value of the time of this component of foregone leisure--in effect, the home wage rate--was assumed to be $1.75 per hour. Presumably, at the margin and in equilibrium, the home wage ought to equal the market wage (which is assumed to be $2.25), but I prefer a lower estimate to account for both the (probably) lower average home wage (which is relevant for

measuring the total value of the leisure time foregone) and to account for (possible) imperfections or rigidities that could cause a discrepancy between home and market wages.

TABLE C-2

Costs to the Wife of Foregone Earnings and of Foregone Leisure from Rearing and Rasing a Child Compared with Having No Children Under 14. (Annual Hours and Earnings)

	MARKET WORK				HOME WORK		
(1) Age of Child	(2) Hours Worked by Mother	(3) Hours Foregone = 1000-(2)	(4) Dollars Foregone ($2.25 X (3))	(5) Present Value of ($) Earnings Foregone (Discounted at 7%/Year)	(6) Age of Child	(7) Hours	(8) Cost = $1.75 X (6)
-1/2 to 1/2[a]	106	894	$2012	$2012	0-1	728	$1274
1/2 to 1 1/2	191	809	1820	1701	1-2	728	1274
1 1/2 to 2 1/2	219	781	1757	1535	2-3	728	1274
2 1/2 to 3 1/2	237	763	1717	1402	3-4	520	910
3 1/2 to 4 1/2	279	721	1622	1237	4-5	520	910
4 1/2 to 5 1/2	289	711	1600	1141	5-6	520	910
5 1/2 to 6 1/2	620	380	855	570	6-7	260	455
6 1/2 to 7 1/2	620	380	855	532	7-8	260	455
7 1/2 to 8 1/2	620	380	855	498	8-9	260	455
8 1/2 to 9 1/2	620	380	855	465	9-10	260	455
9 1/2 to 10 1/2	620	380	855	435	10-11	260	455
10 1/2 to 11 1/2	620	380	855	406	11-12	260	455
11 1/2 to 12 1/2	620	380	855	380	12-13	260	455
12 1/2 to 13 1/2	620	380	855	355	13-14	260	455
13 1/2 to 14 1/2	620	380	855	332			
PV of sum	-	-	-	$13,001	-	-	$7,103

Columns (5) + (6) = Present Value = $20,104

[a]Some time is lost due to pregnancy.

Estimated LFPR's Over a Six-Year Period for a Mother With Children Aged 0, 4, and 6 at Year 0.

Year (and age of youngest child)	LFPR
0	15.2
1	23.5
2	26.2
3	28.1
4	32.1
5	33.2

Source: Bowen and Finegan, op. cit., page 676.

It is assumed that if the mother had not had the child in year 0 she would have the same LFPR as shown above for a mother with the youngest child aged 4, except for the adjustment due to her younger age. Clearly, the former mother is four years younger in year 0 than the latter mother in year 4, since we assume that the two mothers are identical in all respects except for the birth of the third child in year 0.

The mother with two children is assumed to be five years younger when her youngest child is 6 (in year 2) than when the mother with three children reaches the point (in year 6) when her youngest child is 6. As shown in Bowen and Finegan, wives who are five years younger tend to have LFPR's that are higher by about two percentage points.

The next step in constructing the age profiles of LFPR's consists in using the Bowen and Finegan estimates for mothers (now aged 30-34) whose youngest child is between 6 and 13 (holding other characteristics constant as before). This estimated LFPR is 50.7, and centering this rate at the year when the youngest child is age 9.5 and interpolating, we have:

Comparison 2: Indirect cost of having a third child.

In measuring the costs of market work foregone in having a third child, the comparison group will be mothers with two children, aged 4 and 6. Thus, for the first year the differences in hours worked is shown by a comparison between wives with two children aged 4 and 6 and wives with three children, aged 0, 4, and 6.

Bowen and Finegan (p. 676) estimate that white mothers, aged 25-29, with 12 years of schooling, an employed husband, and with family income (not including her own earnings) equal to $4,000-4,999, would have a labor-force participation rate (LFPR) of 15.2 if there were children betwen age 6 and 13 and a youngest child less than one year old. What the expected LFPR would be for mothers with these characteristics and a third child, aged 4, is not known because Bowen and Finegan do not give such extensive classifications. However, the mother with children aged 0, 4, and 6 would be included in the classifications shown above in which the youngest child is 0 and there are some children aged 6-13.

Bowen and Finegan also show the expected LFPR for the same type of mother except that the age of the youngest child is 1, 2, 3, 4, and 5, respectively. As in the previous calculations shown in Table C-2, I will assume that the cross-section can be projected over time, so that the LFPR of the wife with a child now aged 0 will be equal next year to the LFPR of a wife with a youngest child aged 1, and so on. On this basis, the results for the first five years are as shown below:

Estimated LFPR's Over an Eight-Year Period for a Mother with Children Aged 6, 10, and 12 at Year 6

Year (and age of youngest child)	LFPR
6	37.1
7	41.1
8	44.9
9	48.8
10	52.7
11	56.6
12	60.5
13	64.4

Source: Bowen and Finegan, op. cit., p. 679.

In addition to the LFPR there is another component of the time spent at work; namely, hours worked when the person is in the labor force. This dimension is introduced explicitly into the comparison of mothers with and without a third child. Again, Bowen and Finegan provide some estimates of the hours worked per week for wives who were working, according to the age of the youngest child and other characteristics. The three main classifications are for mothers whose youngest child is: (1) under 6; (2) 6-13; (3) 14 and over. The average hours worked per week were found to be about 31, 35, and 38 hours, respectively (Bowen and Finegan, p. 682). With some "free hand" extrapolation and interpolations, these figures were used as a basis for weighting the LFPR's for each year in the age profile for the two types of mothers. The resulting tabulations are shown in Table C-3.

TABLE C-3

Costs to Wife of Foregone Earnings from Raising a Third Child Compared with Raising Just Two Children

With a Third Child			With Two Children			Foregone Earnings	
Year and Age of Youngest Child[a]	LFPR	Weekly Hours	Age of Youngest	LFPR	Weekly Hours	Expected Earnings Difference[b]	Discounted Earnings
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	15.2	14	4	34.1	32	$1028	$1028
1	23.5	24	5	35.2	33	699	653
2	26.2	28	6	39.1	35	743	649
3	28.1	30	7	43.0	35	775	632
4	32.1	32	8	46.9	35	719	549
5	33.2	33	9	50.8	35	798	569
6	37.1	35	10	54.7	35	721	480
7	41.0	35	11	58.6	35	721	449
8	44.9	35	12	62.5	35	721	419
9	48.8	35	13	66.4	35	721	392
10	52.7	35	14	70.2	38	963	490
11	56.6	35	15	70.2	38	803	382
12	60.5	35	16	70.2	38	644	286
13	64.4	35	17	70.2	38	484	201
14	68.2	38	18	70.2	38	89	35
15	68.2	38	19	68.2	38	0	0
						Sum = Present Value =	$7214

[a]The year designation represents the age of the youngest child only for the mother who is assumed to have a third child.

[b](7) = [(2) X (3) X 52 - (4) X (5) X 52] X $2.25 where 52 is the number of weeks in the year and $2.25 is the assumed wage rate.

Appendix D

A decrease in the ages at which women have children (parity progression), whether stemming from a decrease in age at marriage or just a more rapid bunching of childbearing in the years after marriage, has several separable effects on population growth. For convenience, I will refer in this appendix to a single variable which is likely to change as a consequence of changes in the age at marriage and in parity progression: mean age of childbearing.

1. For a given intended or desired number of children, the speed-up in timing will leave more years of risk from the time of the birth of the last child to menopause. With existing historical data it is difficult to tell when a higher (lower) level of cohort fertility was causally related to an earlier (later) marriage age (or other sources of a lowering (raising) of the mean age of childbearing) from situations in which other factors were causal to both phenomena. If, for example, an economic depression led to a decline in desired family size and a postponement of marriage, it would be misleading to interpret the latter event as causal to the lower actual completed family size. We can say, with some certainty, that the causal connection between the mean age of childbearing and total number of children born has been, and will be, weakened by advances in birth control. Indeed, the advent of "perfect contraception" would eliminate the causal connection between the age at marriage and completed family size.

2. A decline in mean age of marriage will show up in an increase in period fertility rates. This can be easily seen if we imagine that

in any given year the cohort about to commence marriage and childbearing were to decrease by one year its mean age of childbearing (i.e., each child in the parity progression is born when the wife is one year younger than the prevailing age fertility pattern). We assume that no change in completed family size is desired or achieved--only in the timing. All births from the previous cohort of wives will be doubled up with those of the current cohort, and in the year t+1 the birth rate will rise. This will be offset by decline in year t+1, since all that has happened is a change in timing of the same (by assumption) number of births per woman. This change in mean age of childbearing will, however, affect both the rate of population growth and the amount of population growth, but these effects will be relatively minor, as shown below.

3. Consider first the effect on the stable (or intrinsic or Lotka) growth rate of the population. It is this rate (whether actually stable or stable in some reasonable "average" sense) that gives rise to the possibilities of geometric and even astronomical growths of population, so it may be considered most critical for the determination of population size. A decline in the mean age of childbearing will affect the stable growth rate, r, of the population as revealed by the following formula (taken from A. J. Coale and C. Y. Nye, "The Significance of Age-Patterns of Fertility in High Fertility Populations, Milbank Memorial Fund Quarterly, October, 1961, pp. 631-646):

$$\Delta r = \frac{\ln q_{t+n} - nr}{T + n}$$

where T = the length of a generation ($\approx$ the mean age of childbearing)

n = the number of years by which T changes

q = the proportion of women surviving from age T to T + n.

Some plausible values for the terms are: that q equals 1, since death rates for women in the childbearing years are negligibly different from zero; n equals -3 years (a quite sizeable decrease, so the effects reported are probably overstated); T equals 31 (its approximate value in 1964 in the U.S.). For given values of r, we find the change in r.

r =	.005	.010*	.015*	.020
Δr =	.000537	.00107	.00161	.00214
approx. persons increased per 1000 =	1/2	1	1 1/2	2

*Approximate values of r for the current U.S. population.

These may be judged rather small increases, and it was the judgment of Coale and Nye that the effects of a change in T on low mortality--low fertility populations would be small.

4. A one-time or one-period increase in population stemming from the decline in mean age of childbearing, as illustrated in point 2 above, will affect the long-run population size, although by a much smaller relative magnitude than in the short run. The long-run effect results in part from the small increase in r as noted in point 3 and in part from the new r operating on a larger base population in year t, so that by the time year t + 1 arrives the population will be larger by a factor of rt. It should be obvious that a given positive r will create a larger sized number n years hence if the base population is 101 instead of 100.

Conclusion. The main source of the effect of fertility increases on population growth are the increases with respect to completed cohort fertility. Timing decisions, per se, constitute a second order effect in the context of a society like the modern-day U.S. Decision about the timing of marriage and of the first and second births after marriage may have some effect on completed cohort family size. If these events take place earlier in the life cycle, then, depending on the rate of contraceptive failures in the additional years of exposure, the long-run growth rate will be higher because of larger completed family size. A change in the mean age of childbearing, by itself, would have to be fairly large, say more than three years, to have a large effect on the rate of population growth in the United States.