

TECHNOLOGY AND THE CHANGING FAMILY: A UNIFIED MODEL OF MARRIAGE,
DIVORCE, EDUCATIONAL ATTAINMENT, AND MARRIED FEMALE LABOR-FORCE
PARTICIPATION

BY

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*C1. Varying the Elasticity of Substitution Between Household Durables and Time in Home
Production*

Here the quantitative importance of the parameter λ for the 1960 economy is assessed. This parameter determines the elasticity of substitution between household durables and household time in home production. Its value is set to 0.19 in the benchmark economy. Suppose this value is increased (decreased) by 20 percent, while keeping all the other parameters of the 1960 economy intact. The results of this experiment are shown in Table C1. The intuition here is that as the value of λ increases (decreases), the inputs in home production become more (less) substitutable. As a consequence, married households can adjust the amount of purchased durables and the time spent in home production. This would imply that married female labor-force participation rate may change. Furthermore, as the economic value of marriage is altered, marriage and divorce decisions can change, too. The results show that these shifts are not dramatic. For instance, when λ is set to a 20 percent lower value (from 0.19 to 0.15), the fraction of working wives is reduced by around 3 percentage point (from 32 percent to 29 percent). The reduction in the fraction of single people is also small (from 15 percent to 14 percent). Thus, the overall fit of the 1960 model economy is not changed dramatically when varying the value of the parameter λ . This parameter cannot be identified well in the model by just using cross sectional data for 1960. Thus, the parameter estimate from McGrattan, Rogerson and Wright (1997) is used.

C2. Varying the Decline of the Prices of Household Durables

The 2005 economy in Table 5 (the prelude) is simulated with an annual price decline for household durables of 5 percent. Here, the economy is simulated for a lower (2.5 percent) and higher (7.5 percent) price decline. The results are shown in Table C2. First, the decline of marriage and the rise of divorce are stronger when the price decline is higher; that is, when the technology of home production improves faster. As a consequence, the fraction of single people rises from 0.21 to 0.29 when the annual price decline rises from 2.5 percent to 7.5 percent. Second, married female labor-force participation is strongly influenced by the rate of price decline of home durables. For instance, if the decline is 2.5 percent, only 55 percent of married women work in 2005 (in the model). If the price decline is raised to 7.5 percent, 84 percent of all married women work.

C3. *Education Costs are Set to 1960 Level*

The education cost parameters are kept at their 1960 level in this modified version of the 2005 prelude—Table 5. The results are shown in Table C3. If the cost of education is not modified, the model does not generate a large increase in the education rates of women. The fraction of educated women moves up very slightly from 0.07 to 0.10. The fraction of educated men rises from 0.13 to 0.20, but this is less than the increase observed in the data.

C4. *No Technological Progress in the Home – General Equilibrium Effects*

The structure employed in the analysis assumes that production is linear in male and female work effort. Consider relaxing this, somewhat. In particular, imagine an aggregate production function of the form

$$\mathbf{o} = \mathbf{z}\mathbf{k}^{\kappa}\mathbf{h}^{1-\kappa},$$

where \mathbf{o} is aggregate output, \mathbf{z} is total factor productivity, \mathbf{k} is the capital stock, \mathbf{h} is the total stock of labor measured in efficiency units, and \mathbf{z} is total factor productivity. Let $\mathbf{k} = 1$ and set $\kappa = 1/3$. The problem with using this production function is the introduction of capital. In particular, are people able to buy or trade capital? To keep things simple, this needs to be ruled out. Suppose that there is a government in the economy. It owns this capital stock. It rents it out at the rental rate r . The proceeds from this rental income are used to finance government spending, g . This government spending could be entered into the utility function in a separable way. This assumption implies that there is no need to think about capital income. Workers will only earn their wages, as they did before. The wage rate for a unit of raw unskilled labor, w_0 , is given by unskilled labors' marginal product

$$w_0 = (1 - \kappa)\mathbf{z}\mathbf{h}^{-\kappa}.$$

Note that \mathbf{h} is simply the sum of labor across all individuals, where each type of labor is weighted by their 2005 efficiency level in production; i.e., a college-educated woman of ability level a is weighted by $\phi_{2005}(w_{1,2005}/w_{0,2005})a$. Total factor productivity, \mathbf{z} , is picked so that the model matches the unskilled wage rate for 2005. This implies that $\mathbf{z} = 1.61$.

The results are shown in Table C4. Somewhat surprisingly, married female labor-force participation drops even further. Why? It is true that the general level of wages does rise when married female labor-force participation drops. But when there is no technological progress in the household sector, female labor is greatly valued at home. The rise in the general level of wages makes households better off, *ceteris paribus*, because men now earn more. The positive income effect associated with the increase in husbands' incomes induces more wives to stay at home.

C5. No Change in the Gender Wage Gap

Take the 2005 economy adjusted to match the observed marital sorting level in 2005. Then, shut down the decline in the gender wage gap; i.e., set $\phi_{2005} = \phi_{1960}$. The results for this counterfactual are shown in Table C5. First, there is a sizable change in the education rates for women relative to the 2005 benchmark economy. The fraction of educated women increases by more than 16 percentage points (from 0.33 to 0.50). The larger gender wage gap leads to a negative income effect for single women. This increases the relative value of marriage for these women. Getting into a marriage is easier if the woman is educated; therefore, the rate of education rises. Second, assortative mating declines somewhat. The correlation between educational types drops from 0.53 in the benchmark equilibrium to 0.41. Perhaps a single woman can no longer choose to be as picky about her mate. Third, there is a drop in married female labor-force participation from 0.75 to 0.61. So, the majority of the rise in married female labor-force participation between 1960 and 2005 (in the model) can be attributed to technological progress in the home; recall that when technological advance in the home is shut down, married female labor-force participation drops from 0.75 to 0.26.

Taking stock of the results from the comparative statics exercises suggests that technological progress in the household sector plays an important role in stimulating labor-force participation by married women. The narrowing of the gender wage gap plays a significant, but secondary, role here.

TABLE C1—VARYING THE ELASTICITY OF SUBSTITUTION BETWEEN DURABLES AND TIME IN HOME PRODUCTION

		1960					
		$\lambda = 0.15$		$\lambda = 0.19$ (Bench)		$\lambda = 0.23$	
<i>Education</i>		Fem	Males	Fem	Males	Fem	Males
		0.075	0.130	0.074	0.129	0.075	0.127
<i>Marriage</i>							
Fraction		Sing	Marr	Sing	Marr	Sing	Marr
		0.144	0.856	0.151	0.849	0.158	0.842
Rates		<Coll	Coll	<Coll	Coll	< Coll	Coll
–Marriage		0.890	0.885	0.888	0.882	0.885	0.876
–Divorce		0.037	0.038	0.044	0.040	0.049	0.044
<i>Sorting</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.840	0.030	0.843	0.028	0.846	0.026
Coll		0.086	0.044	0.085	0.045	0.081	0.047
Corr, educ		0.389		0.403		0.434	
<i>Work, Marr Fem</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.283	0.611	0.318	0.586	0.351	0.576
Coll		0.222	0.312	0.207	0.294	0.209	0.280
Participation, all		0.289		0.315		0.342	
Income, frac		0.111		0.122		0.133	
<i>Inequality</i>							
Gini		0.311		0.307		0.305	
Ratio 90/10		4.556		4.536		4.366	
Ratio 50/10		2.219		2.043		2.222	
Income, Sf/M		0.405		0.393		0.384	
<i>Income, Marr</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.941	0.687	0.943	0.700	0.945	0.710
Coll		1.414	1.530	1.400	1.501	1.391	1.486
Skill Premium		1.557		1.565		1.573	
Gender Gap		0.427		0.419		0.414	

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TABLE C2—VARYING THE PRICE OF DURABLES

		2005					
		$\gamma = 0.025$		$\gamma = 0.05$ (Prelude)		$\gamma = 0.075$	
<i>Education</i>		Fem	Males	Fem	Males	Fem	Males
		0.326	0.323	0.331	0.318	0.342	0.307
<i>Marriage</i>							
Fraction		Sing	Marr	Sing	Marr	Sing	Marr
		0.210	0.790	0.239	0.761	0.287	0.713
Rates		< Coll	Coll	< Coll	Coll	< Coll	Coll
–Marriage		0.844	0.848	0.828	0.830	0.795	0.803
–Divorce		0.075	0.044	0.093	0.060	0.120	0.078
<i>Sorting</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.638	0.026	0.644	0.024	0.638	0.032
Coll		0.032	0.304	0.024	0.308	0.017	0.313
Corr, educ		0.868		0.892		0.891	
<i>Work, Marr Fem</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.597	0.121	0.745	0.440	0.853	0.836
Coll		0.744	0.481	0.793	0.671	0.632	0.813
Participation, all		0.554		0.716		0.841	
Income, frac		0.257		0.323		0.372	
<i>Inequality</i>							
Gini		0.353		0.362		0.375	
Ratio 90/10		5.855		6.341		6.785	
Ratio 50/10		2.529		2.688		2.762	
Income, Sf/M		0.431		0.391		0.358	
<i>Income, Marr</i>							
<u>Husband</u>		<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll		< Coll	Coll	< Coll	Coll	< Coll	Coll
		0.742	0.940	0.737	0.843	0.736	0.722
Coll		1.112	1.535	1.198	1.546	1.164	1.558
Skill Premium		1.987		2.014		2.035	
Gender Gap		0.644		0.634		0.621	

TABLE C3—EDUCATION COSTS SET TO 1960 LEVEL

	1960		2005			
	<i>Benchmark</i>		<i>Experiment</i>		<i>Prelude</i>	
<i>Education</i>	Fem	Males	Fem	Males	Fem	Males
	0.074	0.129	0.103	0.204	0.331	0.318
<i>Marriage</i>						
Fraction	Sing	Marr	Sing	Marr	Sing	Marr
	0.151	0.849	0.255	0.745	0.239	0.761
Rates	<Coll	Coll	< Coll	Coll	< Coll	Coll
–Marriage	0.888	0.882	0.833	0.801	0.828	0.830
–Divorce	0.044	0.040	0.103	0.086	0.093	0.060
<i>Sorting</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	< Coll	Coll	< Coll	Coll	< Coll	Coll
	0.843	0.028	0.807	0.003	0.644	0.024
Coll	0.085	0.045	0.081	0.109	0.024	0.308
Corr, educ	0.403		0.707		0.892	
<i>Work, Marr Fem</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	< Coll	Coll	< Coll	Coll	< Coll	Coll
	0.318	0.586	0.747	0.268	0.745	0.440
Coll	0.207	0.294	0.542	0.675	0.793	0.671
Participation, all	0.315		0.721		0.716	
Income, frac	0.122		0.324		0.323	
<i>Inequality</i>						
Gini	0.307		0.360		0.362	
Ratio 90/10	4.536		6.046		6.341	
Ratio 50/10	2.220		2.729		2.688	
Income, Sf/M	0.393		0.378		0.391	
<i>Income, Marr</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	< Coll	Coll	< Coll	Coll	< Coll	Coll
	0.943	0.700	0.814	1.107	0.737	0.843
Coll	1.400	1.501	1.479	2.022	1.198	1.546
Skill Premium	1.565		2.233		2.014	
Gender Gap	0.419		0.594		0.634	

TABLE C4—MARRIED FEMALE LABOR-FORCE PARTICIPATION IN GENERAL EQUILIBRIUM

	<i>Experiment/G.E. Effects</i>	<i>Experiment/No G.E. Effects</i>	<i>Benchmark</i>
Participation	0.237	0.262	0.745

TABLE C5—NO CHANGE IN GENDER WAGE GAP

	1960		2005			
	<i>Benchmark</i>		<i>Experiment</i>		<i>Benchmark</i>	
<i>Education</i>	Fem	Males	Fem	Males	Fem	Males
	0.074	0.129	0.499	0.316	0.334	0.317
<i>Marriage</i>						
Fraction	Sing	Marr	Sing	Marr	Sing	Marr
	0.151	0.849	0.278	0.722	0.284	0.716
Rates	<Coll	Coll	< Coll	Coll	< Coll	Coll
–Marriage	0.888	0.882	0.826	0.815	0.815	0.808
–Divorce	0.044	0.040	0.113	0.132	0.117	0.123
<i>Sorting</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	0.843	0.028	0.448	0.239	0.574	0.106
Coll	0.085	0.045	0.067	0.246	0.101	0.219
Corr, educ	0.403		0.407		0.526	
<i>Work, Marr Fem</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	0.318	0.586	0.671	0.632	0.742	0.823
Coll	0.207	0.294	0.394	0.537	0.577	0.795
Participation, all	0.315		0.610		0.745	
Income, frac	0.122		0.255		0.335	
<i>Inequality</i>						
Gini	0.307		0.368		0.366	
Ratio 90/10	4.536		6.575		6.214	
Ratio 50/10	2.220		2.278		2.348	
Income, Sf/M	0.393		0.327		0.418	
<i>Income, Marr</i>						
<u>Husband</u>	<u>Wife</u>		<u>Wife</u>		<u>Wife</u>	
< Coll	0.943	0.700	0.748	0.823	0.727	0.884
Coll	1.400	1.501	1.383	1.526	1.313	1.629
Skill Premium	1.565		2.044		2.019	
Gender Gap	0.419		0.454		0.635	