

Dynamics and Policy Evaluation

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What does “dynamics” mean?

- There are several meanings of “dynamics” in economics - for example:
- Models with stock and flow variables
- Models with habit persistence/state dependence in behavior
- Models where forcing variables affect outcomes with time lags (e.g. monetary transmission)
- Models where the impact of policy variables change with time, or depending on whether the policy was **expected or unexpected**
- Models where the **expected future** economic/policy environment affects **current** decisions

My Focus Here:

- Models where the impact of policy variables change with time/age, or depending on whether the policy was **expected or unexpected**
- Models where the **expected future** economic/policy environment affects **current** decisions

Four Examples

- I will look at evaluations of effects of
 - Wage Subsidies for Low Earners
 - The Earned Income Tax Credit
 - Permanent Changes in Tax Rates
 - Welfare Benefit Rules
- In each case, I will ask if evaluations that ignore dynamics are misleading

Example #1: Wage Subsidies

- Human capital investment decisions (e.g., whether to finish HS, whether to go to College), are influenced by the gains to College
- Of course, college educated workers are likely to obtain high-wage high-skilled jobs.....
- while non-College workers are more likely to take low-wage jobs

Example #1: Wage Subsidies

- In 1997, Ed Phelps proposed wage subsidies for low wage workers as a way to reduce growing earnings inequality
- But wage subsidies for low-wage workers would reduce the returns to education (i.e., reduce the COL/HS wage premium)
- This may cause fewer people to attend college / more people to drop out of HS

Example #1: Wage Subsidies

- Quantitative Evaluation:
- Keane and Wolpin (J. of Labor Econ., 2000), “Black - White Differences in Labor Market Success”
- We estimate a dynamic sequential model of school and work decisions using the NLSY79 - young men aged 14 to 21 in ‘79
- Annual school and work decisions from age 16 onward (K-W, JPE ‘97 model)

Example #1: Wage Subsidies

- We use the model to simulate the following policy proposed by Phelps (1997):
- Subsidy = $1/3$ of the difference between ones wage rate and \$12.00 per hour
- \$24,000 per year in '93 US\$ (34k in '06\$)
- The simulation is done assuming people are aware of the subsidy from age 16 onward (Long Run effect)

Example #1: Wage Subsidies

- Results for White Males

Outcome:	Baseline	Subsidy
HS drop out	26.2%	35.8%
HS grad	29.6%	31.0%
Some College	19.1%	13.9%
College grad	25.1%	19.3%
Mean earnings at age 30	\$22,795	\$23,678

Example #1: Wage Subsidies

- Results for Black Males

Outcome:	Baseline	Subsidy
HS drop out	37.9%	41.2%
HS grad	31.5%	34.9%
Some College	17.9%	15.0%
College grad	12.8%	9.0%
Mean earnings at age 30	\$15,818	\$18,296

Example #2: Earned Income Tax Credit (EITC)

- The EITC was a major part of the US welfare reform of the mid-90s.
- The EITC subsidizes **earnings** (not wages) of low income households
- The subsidy is large - about 40% of earnings up to the maximum, after which it is flat for a while and then tapers off gradually.

Example #2: EITC

- EITC maximum benefits (2004):
- Family with NO children \$ 390
- Family with One Child \$ 2,604
- Family with Two Children \$ 4,300
- Notice that EITC is not only an earnings subsidy but also a **baby bonus**
- Evaluations of its effect on labor supply have treated fertility as given (Short Run analysis)

Example #2: EITC

Quantitative evaluation:

- Keane and Wolpin (2010), “The Effect of Welfare on Life-Cycle Decisions of Women”
- A dynamic sequential model that includes decisions about:
 - School, Marriage, Fertility, Work and Welfare Participation
- The model is estimated using the women in the NLSY79

Example #2: EITC

- We use the model to simulate both Short-run and Long-run effects of EITC. That is:
- What is the SR effect of EITC on labor supply - holding fertility, marriage education, fixed?
- What is the LR effect on a woman who grows up knowing EITC exists, so it may affect fertility, marriage and education?

Example #2: EITC

- In the model, women are divided into several skill endowment types
- Most welfare recipients belong to the lowest skill endowment type
- So we focus on the EITC effect for this group.
- Note: Skill “endowment” is highly correlated with parents’ education

Example #2: EITC

- Results for White Women

Outcome	Baseline	Short Run	Long Run
Working at ages 22-26	35.5%	36.3%	31.0%
Welfare at ages 22-26	25.0%	24.7%	26.9%
Kids born by age 28	2.10	-----	+0.30

Example #2: EITC

- Results for Black Women

Outcome	Baseline	Short Run	Long Run
Working at ages 22-26	20.8%	22.0%	18.1%
Welfare at ages 22-26	61.2%	61.0%	62.9%
Kids born by age 28	2.70	-----	+0.33

Example #3: Tax Effects with Human Capital

- Imai and Keane (IER, 2004)
- Take standard life-cycle model of labor supply and saving (MaCurdy JPE 1981).
- Build a learning-by-doing HC mechanism
- Current work raises future wages
- This has dramatic implications for effects of taxes in the short run vs. the long run

Details of Imai-Keane Model:

- Same Utility function as MaCurdy ('81)
- The HC production function includes
 - diminishing returns to experience
 - depreciation of skills
 - complementarity between human capital and work hours in production of HC (because returns to work experience are lower for the less skilled)
- Includes a bequest motive (to fit assets)
- Model Ages = 20,, 65
- Data: White Males 20-36 (Born 1958-65)
- Assumes interior solutions for hours

Some Validation of Imai-Keane Model

- Provides good in-sample fit to wages, hours and assets (both paths and persistence)
 - One of just 2 or 3 papers to attempt to fit all three!
- Also provides good out-of-sample fit (to age 65)

Example: Drop in Hours from 45-54 to 55-64

McGrattan-Rogerson (CPS) Imai-Keane

-47%

-53%

Table 8: Effects of Permanent Tax Increases on Labor Supply At Different Ages in a Model with Human Capital (Imai-Keane Model)

Age	Age 25		Age 30 (unexpected)		Age 35 (unexpected)	
	Hours	Wage	Hours	Wage	Hours	Wage
25	-2.7					
30	-2.9	-0.4	-2.4			
35	-3.2	-0.7	-2.7	-0.3	-2.3	
40	-3.8	-1.0	-3.3	-0.6	-2.7	-0.2
45	-5.1	-1.3	-4.4	-0.9	-3.8	-0.5
50	-7.9	-2.0	-7.0	-1.4	-6.2	-1.0
55	-13.3	-3.6	-12.2	-2.9	-11.0	-2.3
60	-19.3	-7.5	-18.4	-6.6	-17.4	-5.8
65	-29.2	-11.6	-28.1	-10.7	-26.9	-9.7

Note: The tax increase is 5%. It takes effect (unexpectedly) at the indicated age and lasts until age 65. The proceeds of the tax (in each year) are distributed back to agents in lump sum form.

Effect of Permanent Tax Changes

- The effect of Permanent tax increases grows over time
- This is because they slow down the rate of human capital accumulation, creating a “snowball” effect
- So human capital amplifies the effect of permanent tax changes in the long long
- **Seeing a small short run effect may trick us into thinking elasticities are small**

Example #4: Welfare Rules and how they affect behavior

- Keane and Wolpin (JHR, 2002)
- Very simple illustrative model of welfare participation and fertility
- No labor supply decision – Earnings are simply a stochastic process
- Only women with children are eligible for benefits (So benefits may increase fertility)
- Women base decisions on current and expected future welfare benefit rules

Example #4: Welfare Rules

- Welfare benefit rules evolve according to a stochastic process that differs by US State
- The rules are estimated from US data from 1967-1990 for 6 States
- The rules vary from year-to-year but there is persistence over time:
- Some States have consistently higher benefits than others

Example #4: Welfare Rules

- Results from simulation of model:
- Permanent increases in State benefit levels (induced by changing the stochastic process for benefits) have clear positive effects on fertility
- Transitory increases in State benefit levels (holding the stochastic process fixed) have small and ambiguous effects of fertility

Example #4: Welfare Rules

- Why does this happen? Basic Idea:
- Transitory high benefits will not induce you to have a kid
- That decision depends on expected benefit levels over a long horizon (e.g., 18 years)
- An unusually high current benefit may lead you to expect future reductions, so it can even reduce fertility !!

Example #4: Welfare Rules

- In general, if women are forward looking, the effect of changes in welfare benefits depends on how they form expectations about future benefits
- Changes in benefits can have very different effects depending on whether they are perceived as being permanent or transitory

Example #4: Welfare Rules

- Next step:
- We run regressions on the simulated data similar to those used to study welfare effects of fertility in most empirical work:
- Logit models where fertility is regressed on benefit levels and typical control variables
- With and without State fixed effects

Example #4: Welfare Rules

- Result: Logit models that rely on cross state variation in welfare benefits find positive effects on fertility
- But logit models with State Fixed Effects give ambiguous results, sometimes even perverse negative signs
- We find the same pattern in NLSY79 data from 1979-1991.

Example #4: Welfare Rules

- What is going on?
- The State fixed effects “sop up” the persistent cross-State variation in benefit levels
- Fixed effects identifies benefit effects only from transitory within-State variation
- And as noted, transitory benefit levels are not likely to affect fertility decisions (and may even have negative effects)

Example #4: Welfare Rules

- Estimation methods that rely on different sources of sample variation in benefits may give very different estimates:
- This is simply because they may identify responses to benefit changes that are perceived as having different degrees of permanence
- A key example is variation across states (OLS) versus variation within states over (Fixed Effects).

Example #4: Welfare Rules

- People ought to be much more careful about using Fixed Effects:
- In a dynamic model, doing fixed effects does not just “sop up” unobserved taste differences:
- It can totally change the interpretation of the estimated effect.

Conclusion

- I have looked at evaluations of effects of
 - Wage Subsidies for Low Earners
 - The Earned Income Tax Credit
 - Permanent Changes in Tax Rates
 - Welfare Benefit Rules
- In each case, we see that evaluations that ignore dynamics can be very misleading