Taxation and Household Decisions: an Intertemporal Analysis

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Research questions

- Income tax revenues are the main source of government revenues for most countries (50% in U.S.)

- Countries differ in how to tax married individuals
  - Individual taxation (e.g. Sweden, Canada, and UK)

$$T_{married}(y_1, y_2) = T_{single}(y_1) + T_{single}(y_2)$$

  - Taxes based on pooled income (U.S. and Germany)

$$T_{married}(y_1, y_2) = \tilde{T}_{married}(y_1 + y_2)$$

  - More general alternatives are possible

- **Which family taxation system maximizes welfare?**
- **How do family taxation systems affect welfare inequality?**

This paper

1. Discuss labor supply incentives in the US taxation system
   - Estimate impact of taxation on secondary earner's employment using the 2003 Bush Tax Cuts
2. Build, estimate, and validate a lifecycle model of marriage, divorce, and household decisions
3. Calculate optimal tax parameters under four different family taxation systems

Preview of Results

1. The US joint system is close to the optimal income splitting system (the optimal is a bit more progressive)

2. The optimal individual taxation system produces higher utilitarian welfare than income splitting, but women with low earnings potential lose

3. A more general joint system generates the highest welfare, but is difficult to implement

4. **Income splitting + a flat deduction for a secondary earner income** is simple, outperforms the individual system, and spreads welfare gains more evenly

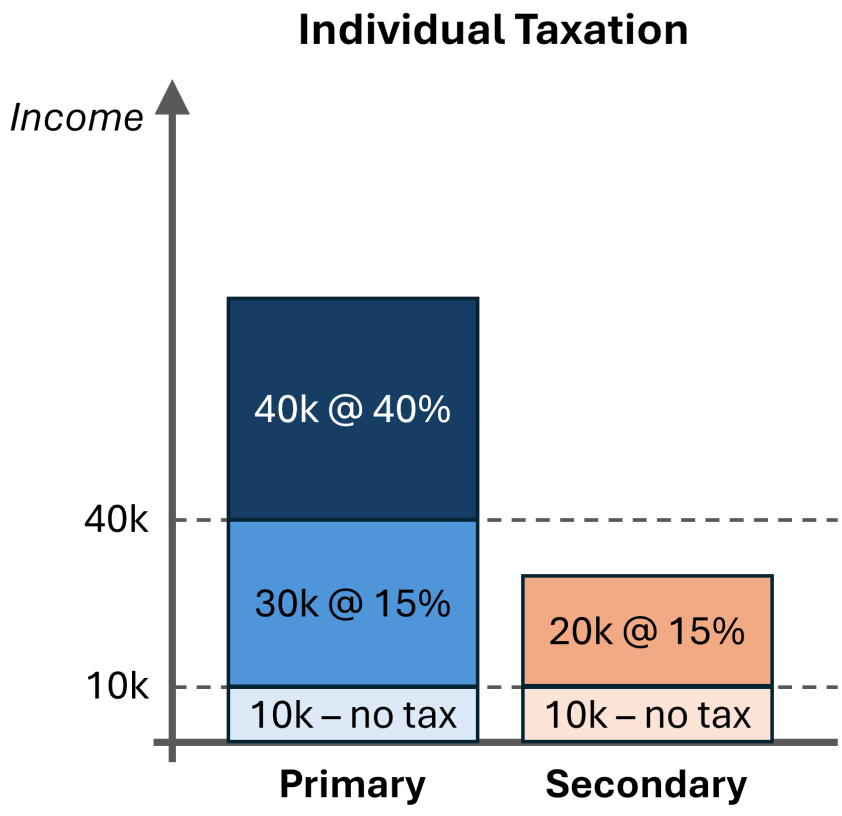
Related Literature

- Apps and Rees (1988, 1999a,b), Kleven, Kreiner, Saez (2009), Frankel (2014), Alves et al (2023), Golosov and Krasikov (2023), Bierbraner et al. (2023), ...
- Guner, Kaygusuz, and Ventura (2012), Gayle and Shephard (2019), Borella, De Nardi, and Yang (2022)
- Bick and Fuchs-Schuendeln (2017), Bick et al. (2019)
- Kearney and Turner (2013)

Outline

1. **Descriptive and Reduced-Form Evidence**
2. Model
3. Estimation and Validation
4. Comparison of Tax Systems
5. Conclusion

Income-Splitting vs. Individual Taxation: Example



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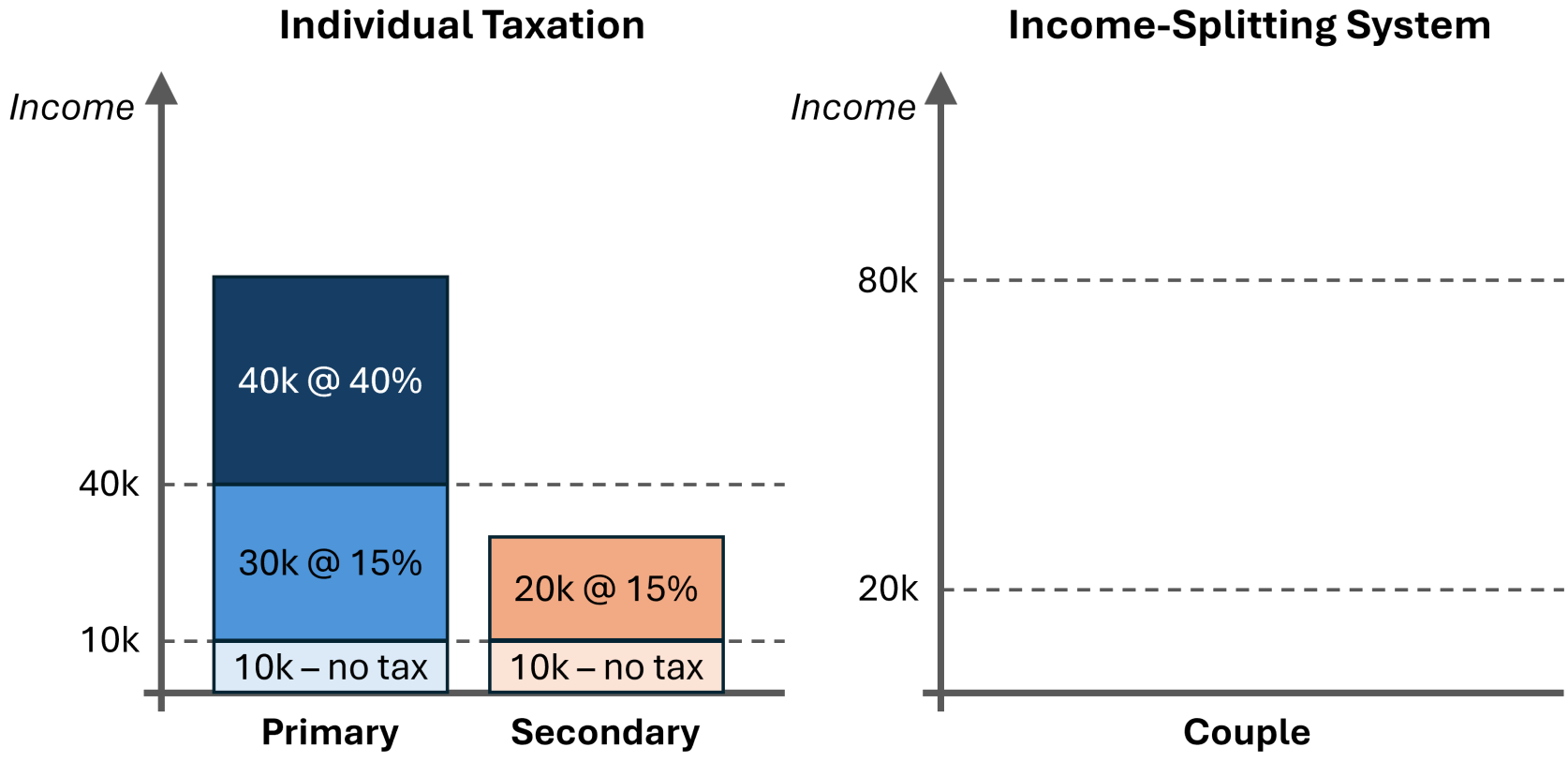

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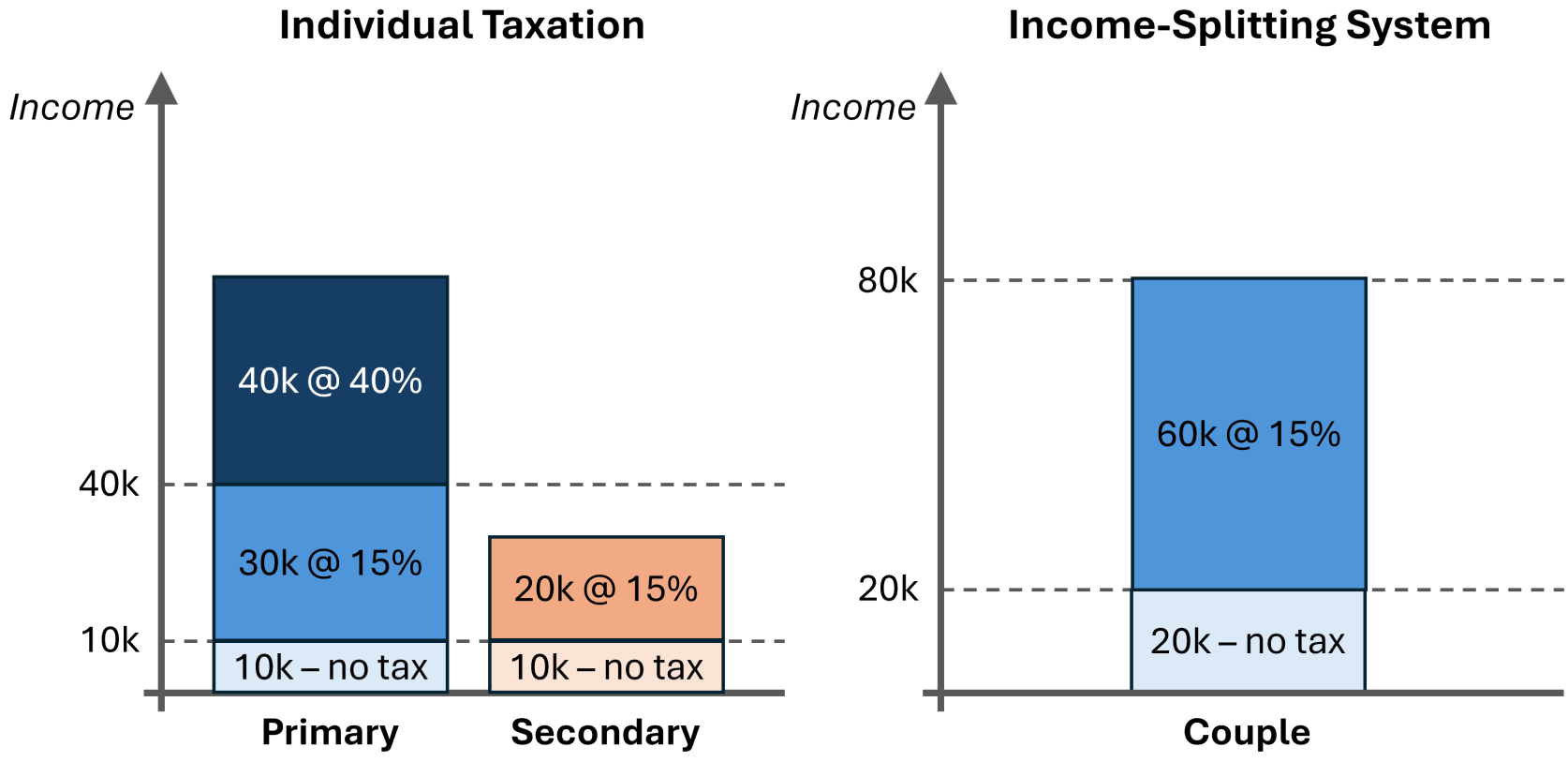

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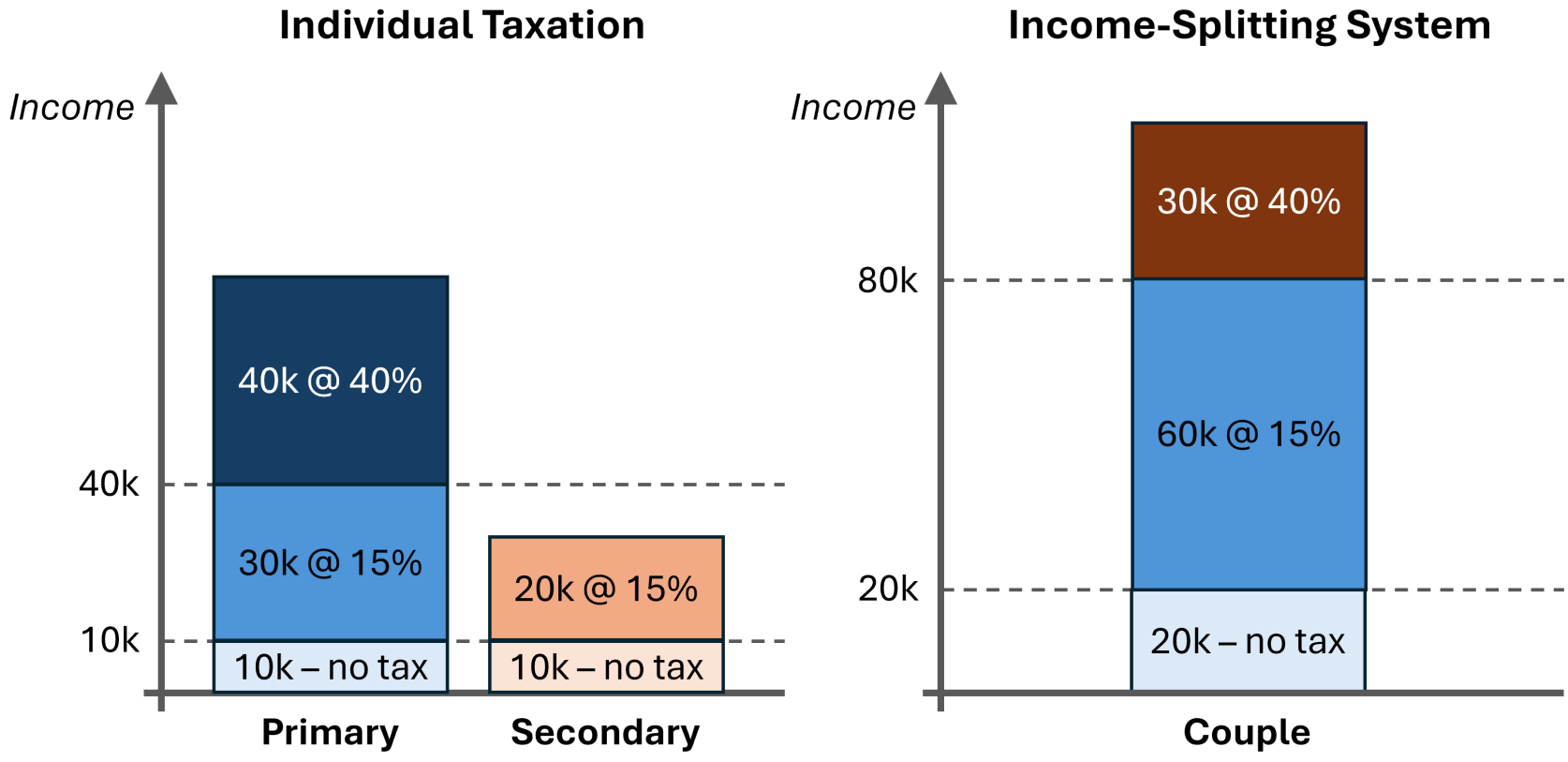

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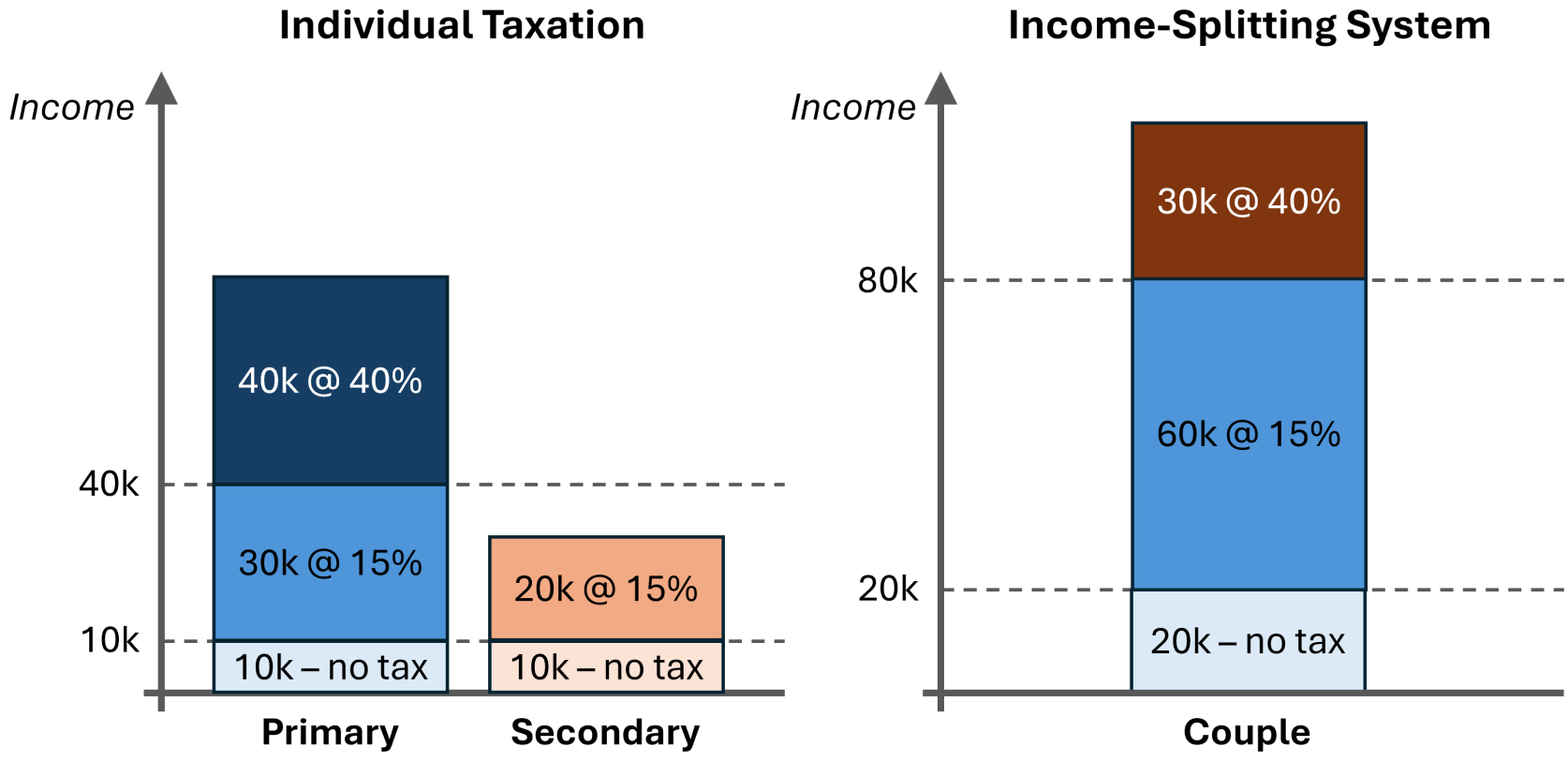

Tax rates for the secondary earner:

- Marginal: 15% under Individual System, 40% under Income Splitting
- Average: 10% under Individual System, 40% under Income Splitting

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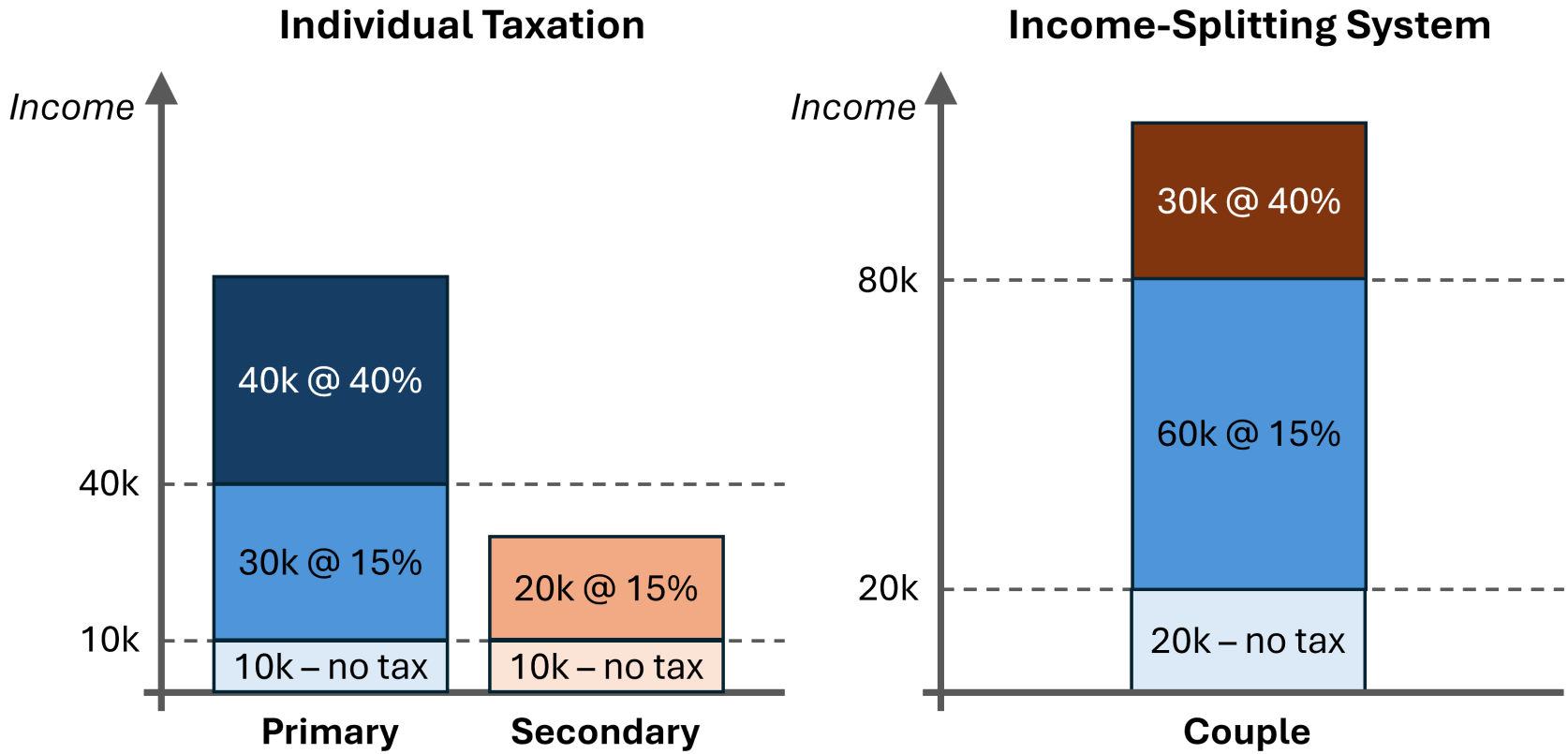
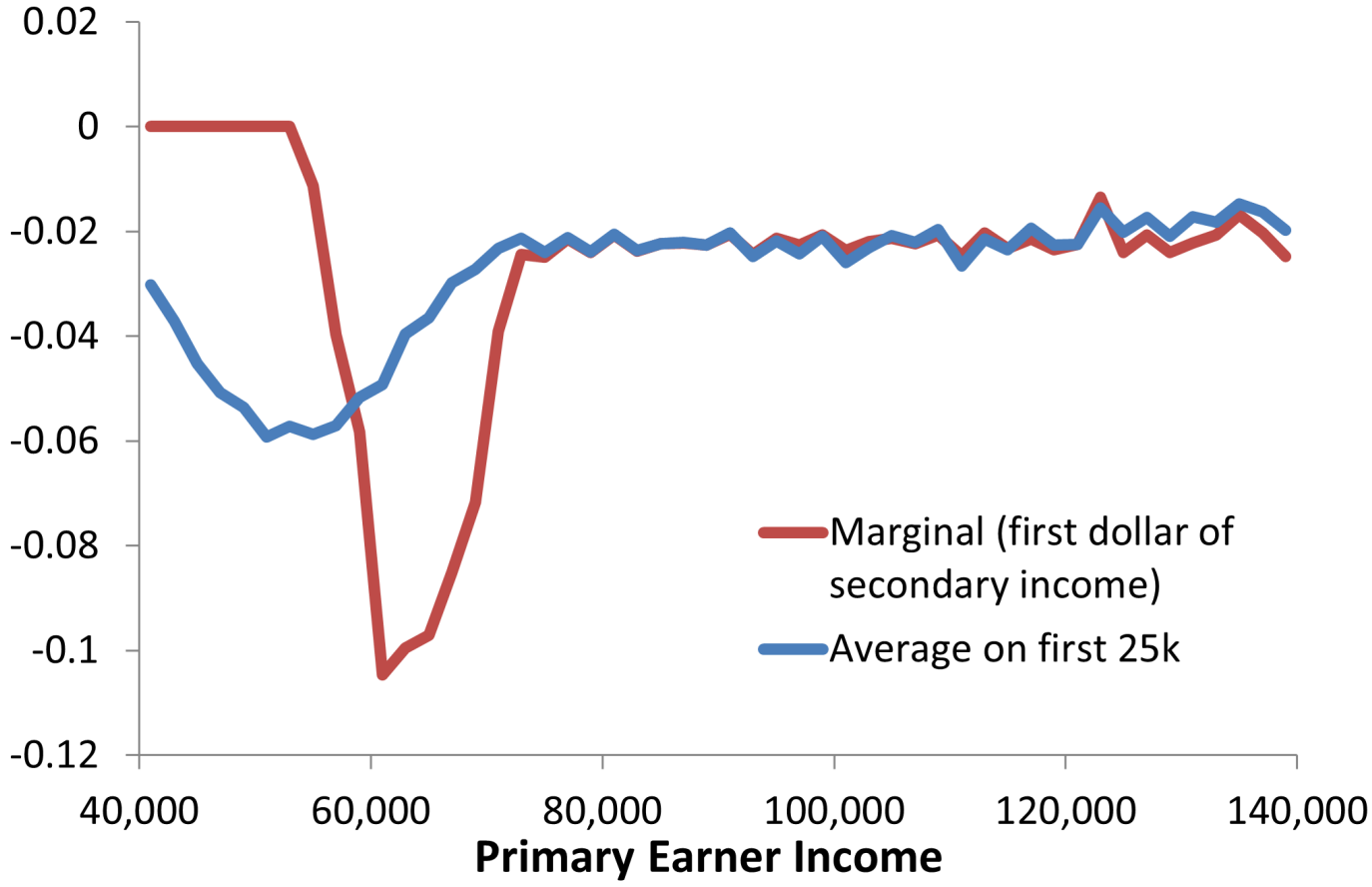


After-tax income for the couple:

- \$86.5k under Individual System, \$89k under Income Splitting
- The *marriage bonus* is \$2.5k
- Bonuses increase with specialization
- ▸ Cross-sectional patterns

2003 Bush Tax Cuts



- **Sample:** CPS, tax years 2001-2005; couples where primary earner works full-time and earns between \$40k and \$140k
- Tax rates calculated using TAXSIM

Secondary earner responses to Bush Tax Cuts

$$SecondaryEarnerWorks_{it} = \beta \tilde{\tau}_{i,t} + \sum_{k=1}^{20} \alpha_k inc_{k,i,t} + \delta_t + \gamma X_{i,t} + \varepsilon_{it}$$

- $\tilde{\tau}_{i,t}$: Average tax on first 25k
- $inc_{k,i,t}$: Primary earner in family (i, t) is in income bin k

	(1)	(2)
	CPS Data	
$\tilde{\tau}_{i,t}$	-0.651***	-0.314**
	(0.138)	(0.144)
$\tilde{\tau}_{i,t} \times YoungChild_{i,t}$		-0.534***
		(0.0762)
N	93115	93115

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1. Descriptive and Reduced-Form Evidence
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Overview of the model

- Simulate the lifecycle of a cohort of individuals
- Model begins at start of working life; education and unobserved ability are exogenous
- T work periods, followed by R simplified retirement periods
- Choices in every work period:
  - Time split between labor, leisure, and household production
  - Resource allocation between consumption, savings, and market inputs used for household production
  - Marrying or not (if single); divorce or not (if married)

Single-period preferences

$$u\left(c^i, l^i, Q, \theta | \kappa, m\right) = \frac{\left(c^i\right)^{1-\sigma_c}}{1-\sigma_c} + \gamma_l \frac{\left(l^i\right)^{1-\sigma_l}}{1-\sigma_l} + \gamma_Q^{\kappa,m} \log Q + \theta$$

- c_i is private consumption, l_i is private leisure
- Q is the household *public good*
  - Produced using time and/or market-purchased inputs
  - Parameter $\gamma_Q^{\kappa,m}$ depends on child status (no children, children younger than 6, children older than 6) and marriage status
- θ is marriage quality ($\theta = 0$ for singles)

Work, wages, and human capital

- Four employment choices: none, part time, full time, more than full time (45h)
- Pre-tax wage depends on education, gender, unobserved ability, and *accumulated human capital*
  - Estimated separately using a selection model
- Human capital accumulates when working and depreciates when not working

Marriage, divorce, fertility

- Every period, singles are paired with a potential match and get a random draw of marriage quality θ
  - Decide to marry by looking at lifetime expected utility
- Married households make choices efficiently but cannot commit to future allocations (Mazzocco 2007).
- Married individuals get marriage quality shocks and may choose to divorce if continuation value of marriage is too low.
- Childbirth is random for married women ages 20-35; children age stochastically
- Children affect production and value of public good Q; young children also require daycare for working parents

Taxes, transfers, benefits

- We code in detail the following elements of the tax system:
  - Federal income tax schedule
  - Average state taxes
  - Earned Income Tax Credit
  - Child Tax Credit
  - Child and Dependent Care Credit
  - SNAP
  - SS/Medicare taxes

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Estimation

- Data sources: PSID, CPS, American Time Use Survey (ATUS), and Consumer Expenditure Survey (CEX)
- Some parameters are calibrated: $\beta = 0.98$, $\sigma_c = 1.5$
- Wage parameters and childbirth/child aging processes estimated externally
- All the other parameters are estimated using the Simulated Method of Moments

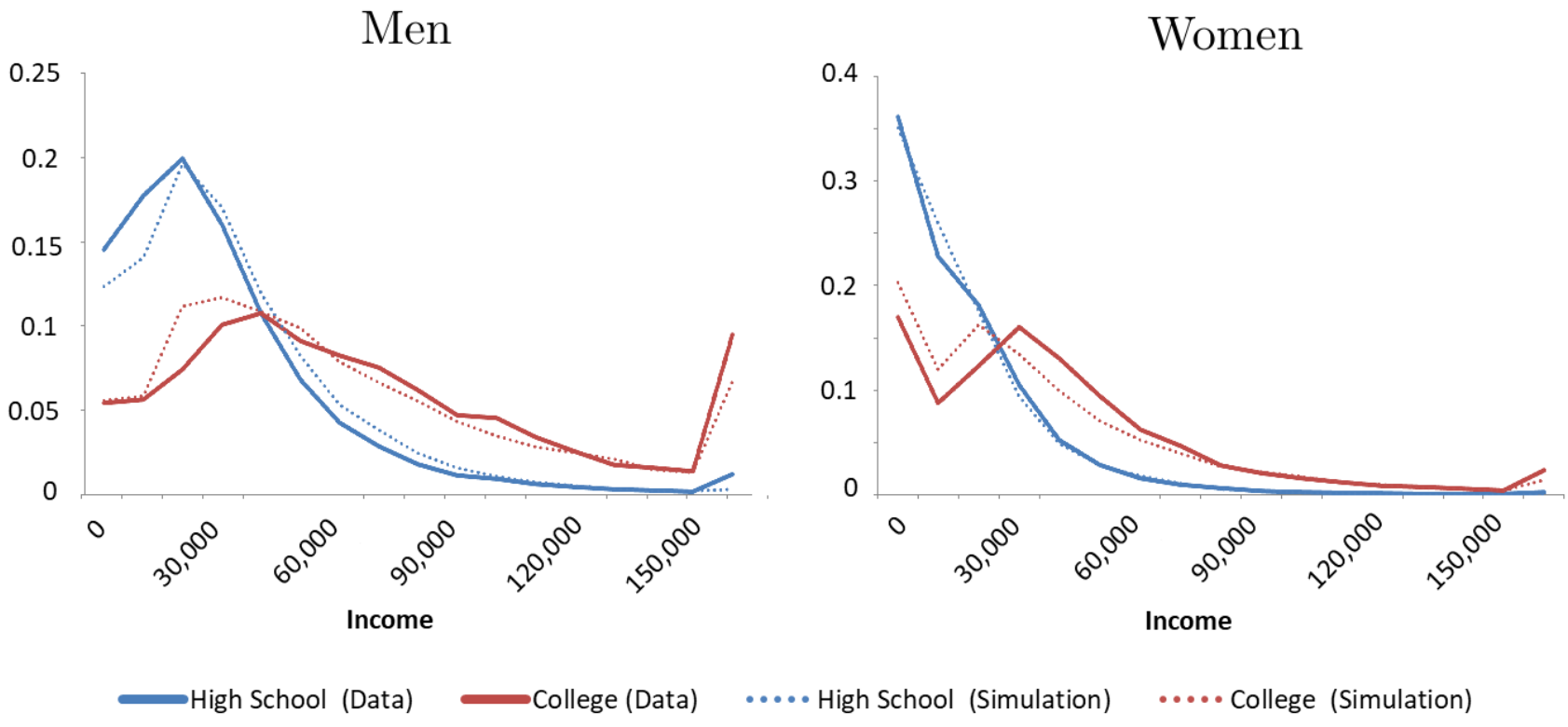
▸ Estimation: Moments

Quality of fit, targeted moments (1/5)

Moment:	Data	Model
Share Married, Ages 22 to 60	0.61	0.65
Share Divorced, Ages 22 to 60	0.12	0.11
Share w/Child < 6, Ages 22 to 38	0.34	0.38
Weekly Hours Spent in Home Production:		
Men	12.3	14.1
Women	25.2	21.2
Share of Households in which Woman is Higher Earner:		
When husband is High School Graduate	29.3	33.7
When husband is College Graduate	26.2	31.2

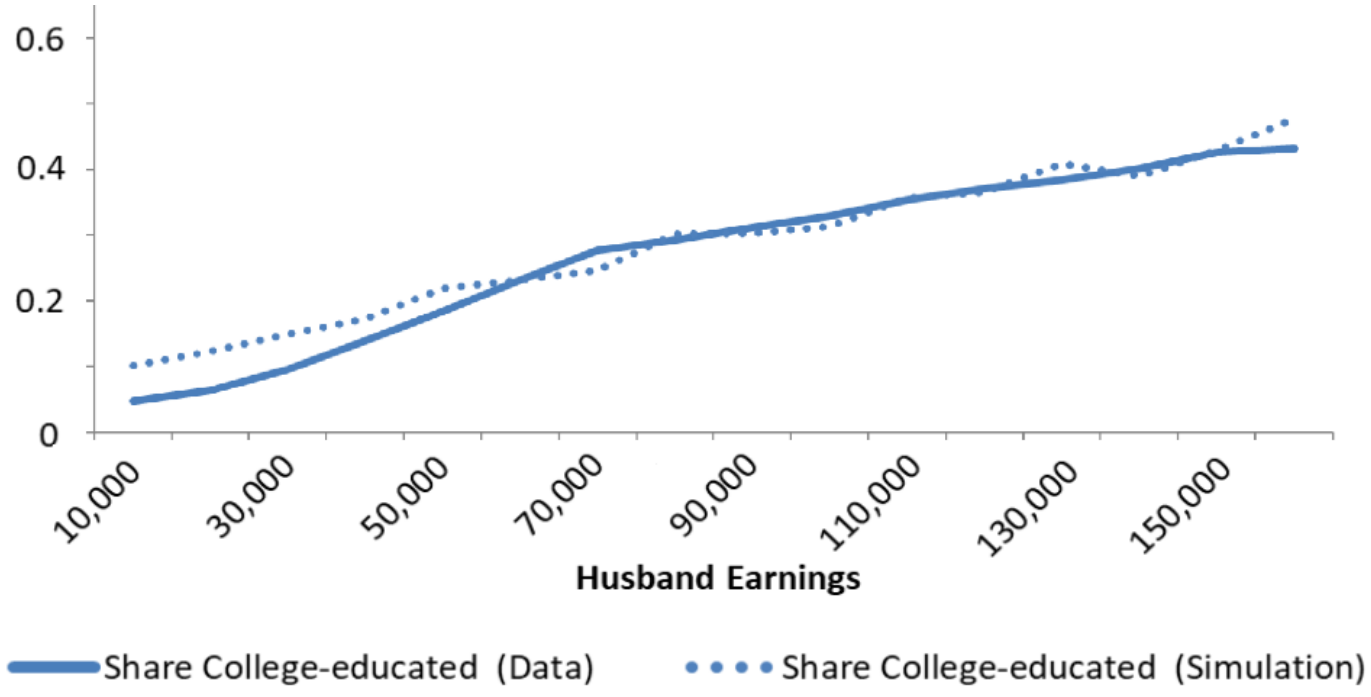
Quality of fit, targeted moments (2/5)

Income Distribution By Education (Ages 25-54)



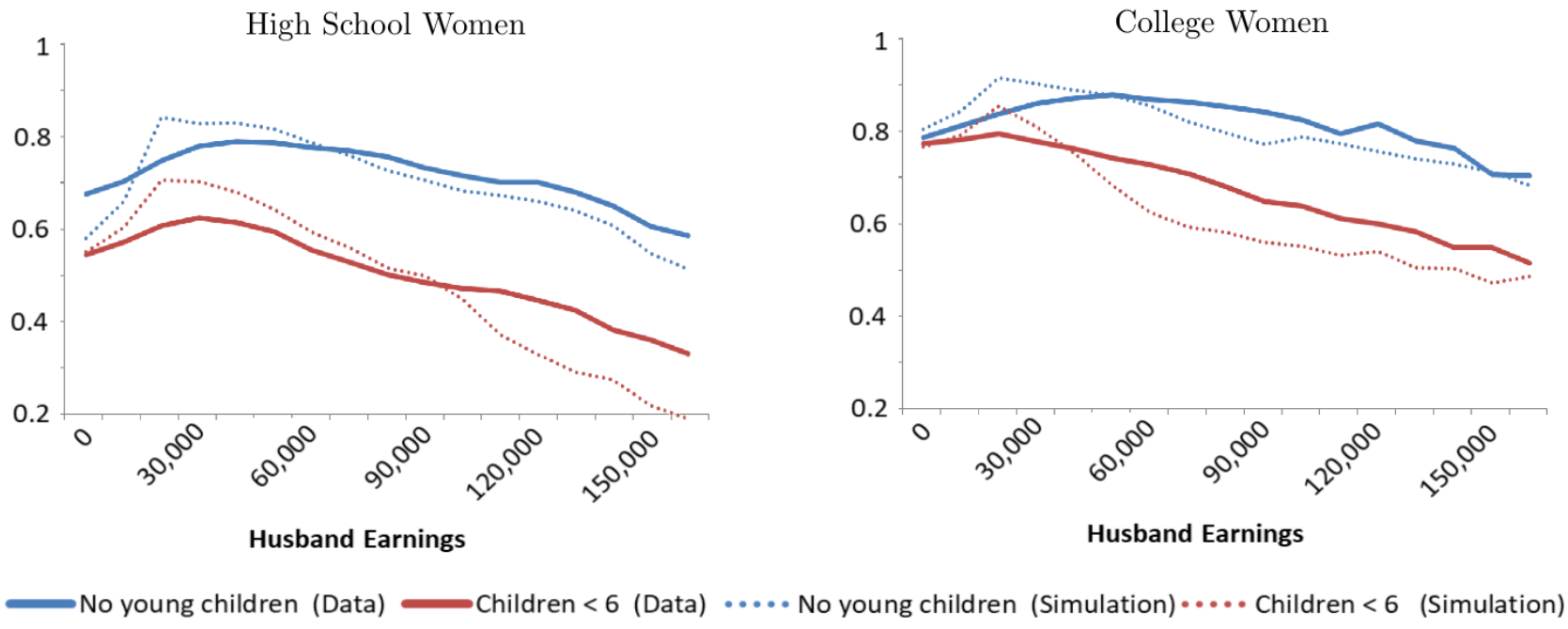
Quality of fit, targeted moments (3/5)

Share of Married Women With College Education, By Husband's Earnings



Quality of fit, targeted moments (4/5)

Share of Married Women Employed, By Husband's Earnings and Child Status



Quality of fit, targeted moments (5/5)

Weekly Time Spent on Leisure: Data and Model Simulation

	No Children		Children 6+	
	Data	Model	Data	Model
All	66.1	66.4	59.3	59.9
Men	65.9	65.9	58.9	58.6
Women	66.4	66.9	59.8	61.2
High School	66.9	67.3	60.2	60.9
College	64.4	64.4	57.3	57.4
Married Women, By Quartile of Husband's Income				
First Quartile	64.5	65.3	59.9	60.5
Second Quartile	63.8	64.6	60.7	62.1
Third Quartile	65.0	66.3	59.0	60.4
Fourth Quartile	66.0	67.2	61.8	62.3

Validation with untargeted moments

- Frisch elasticities implied by the model in line with best available evidence
  - Interesting heterogeneity by gender, education, and presence of young children Go

- Effects of Bush Tax Cuts:

	(1)	(2)	(3)	(4)
	CPS Data		Simulated Data	
$\tilde{\tau}_{i,t}$	-1.281***	-0.865***	-2.037***	-1.190***
	(0.259)	(0.274)	(0.119)	(0.122)
$\tilde{\tau}_{i,t} \times YoungChild_{i,t}$		-0.617***		-1.282***
		(0.142)		(0.0550)
N	25937	25937	123594	123594

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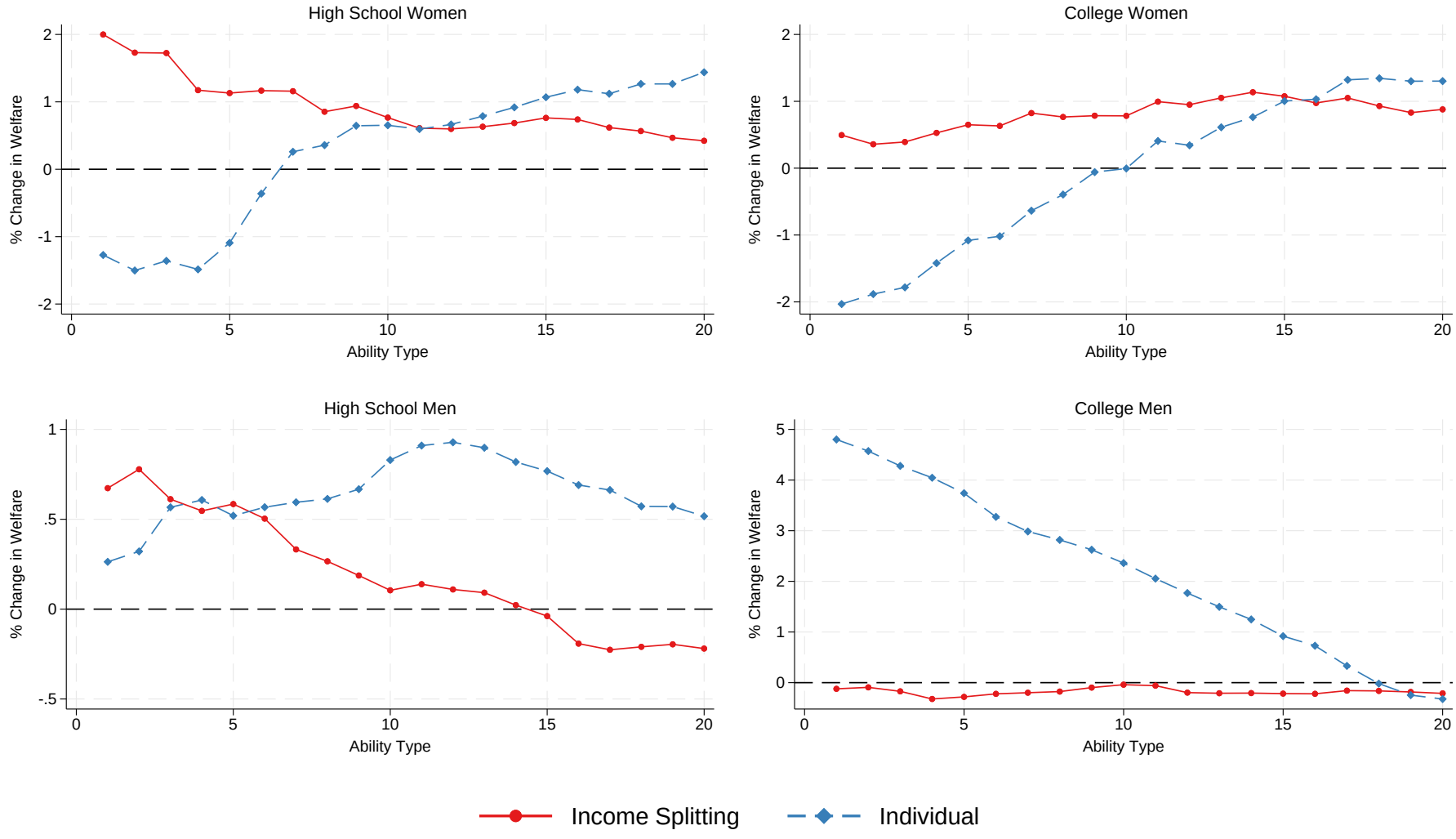
Policy Evaluation

- Using the estimated model, we evaluate four different income tax systems
- For each system, we derive the tax rates that maximize total welfare in the economy, while keeping constant:
  - Tax revenues
  - Tax brackets
  - The welfare system

Income-splitting vs. Individual Taxation

- How much are individuals willing to pay, on average, to move from current system to alternative optimal systems?
  - Optimal joint with income-splitting: 0.9% of income
  - Optimal individual taxation: 1.25% of income
- Individual system raises women's labor force participation by about 10 percentage points ▸ Figure
- Does this mean the individual system is the clear winner?

Income-splitting vs. Individual Taxation: Welfare Results



Income-splitting vs. Individual Taxation

What trade-offs constrain the policymaker?

- **Income-splitting**
  - Hard to redistribute income—high marginal tax on high-earning individual also taxes their spouse!

- **Individual taxation**
  - More progressive, but low-ability secondary earners don't benefit that much from lower taxes on their income
  - Lose a lot from removal of marriage bonuses
  - Women work a lot more, but consumption of household public good falls substantially

Alternative systems

- **General joint system**
  - In the style of Gayle and Shephard (2019)
  - Gives policy-maker more flexibility, yielding much higher average willingness to pay: **2.59%**
  - Very complex: 41 tax parameters! ▸ Optimal parameters

Alternative systems

- **General joint system**
  - In the style of Gayle and Shephard (2019)
  - Gives policy-maker more flexibility, yielding much higher average willingness to pay: **2.59%**
  - Very complex: 41 tax parameters! ▸ Optimal parameters
- **Income-splitting with secondary earner deduction:**
  - Optimal deduction: $9,134
  - Average willingness to pay: **1.3%** with gains spread very evenly
  - Women work more, but also purchase more market goods to maintain level of household consumption

▸ Welfare Figure ▸ Labor Supply

More in the paper

- How each tax system affects:
  - Time allocations: labor, leisure, household production
  - Production of the household good
  - Human capital accumulation
  - Marriage, divorce, and assortative mating
    - Joint system with secondary earner deduction leads to more stable marriages
  - Consumption risk
- Additional exercise: how does limited commitment affect optimal tax rates? ▸ Results

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Conclusion

- Document that secondary earners' employment choices respond to tax rates based on primary earner's income level
  - Stronger responses in households with young children

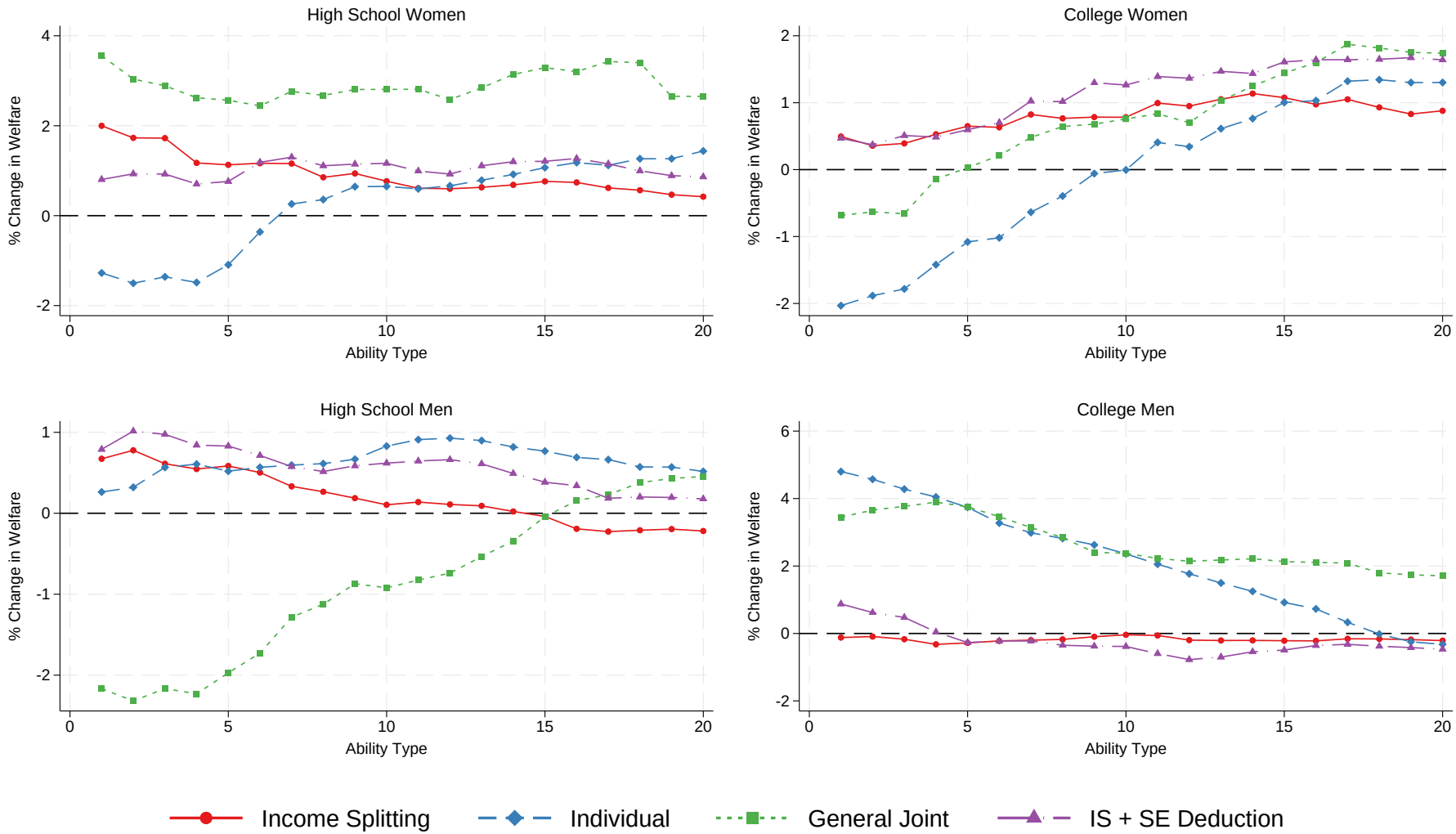
- Build, estimate, and validate a lifecycle model that rationalizes this pattern and many others in the data

- Use the model to evaluate four potential policy reforms
  - Individual taxation: higher welfare than income-splitting system, but also more inequality

  - An income-splitting system with a secondary-earner deduction achieves higher welfare, reduces welfare inequality, and is simple to implement

Thanks!

Welfare (willingness to pay for the reform)



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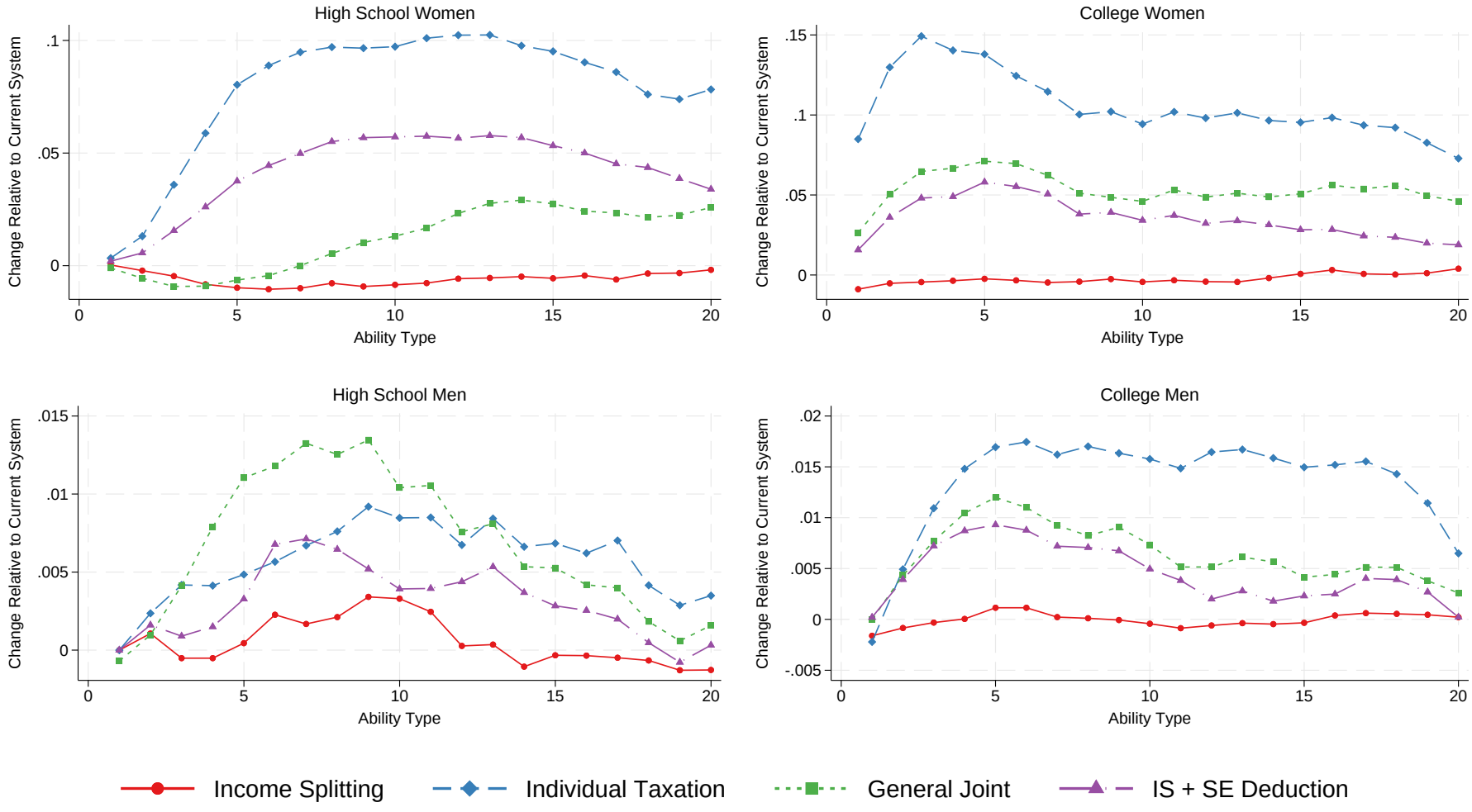
Labor Force Participation



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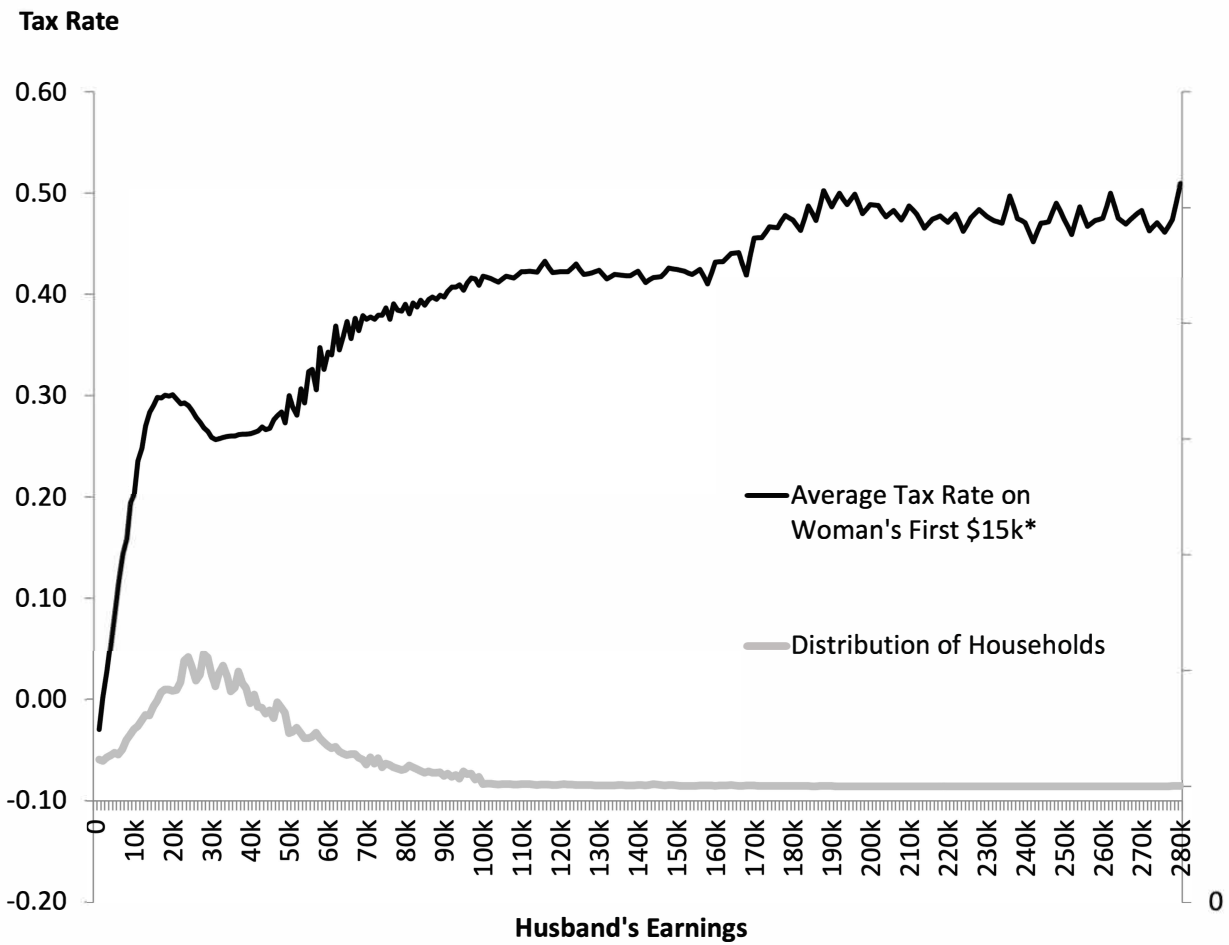
Average Tax Rates

Married Women's Tax Rates, by Husband's Earnings



Source: NBER Taxsim, ACS 2003-2006. Simulation for household without dependents.

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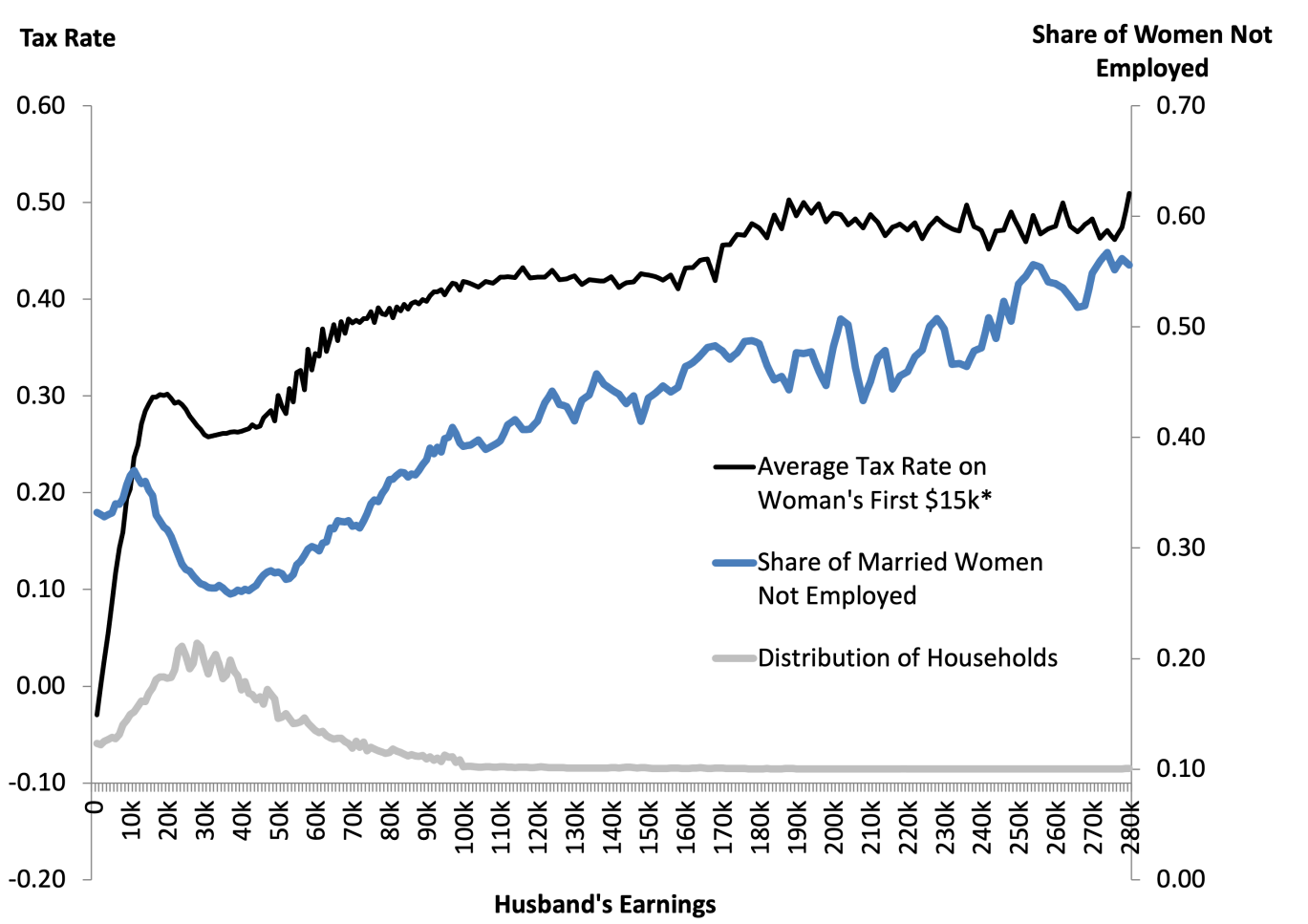

Source: NBER Taxsim, ACS 2003-2006. Simulation for household without dependents.

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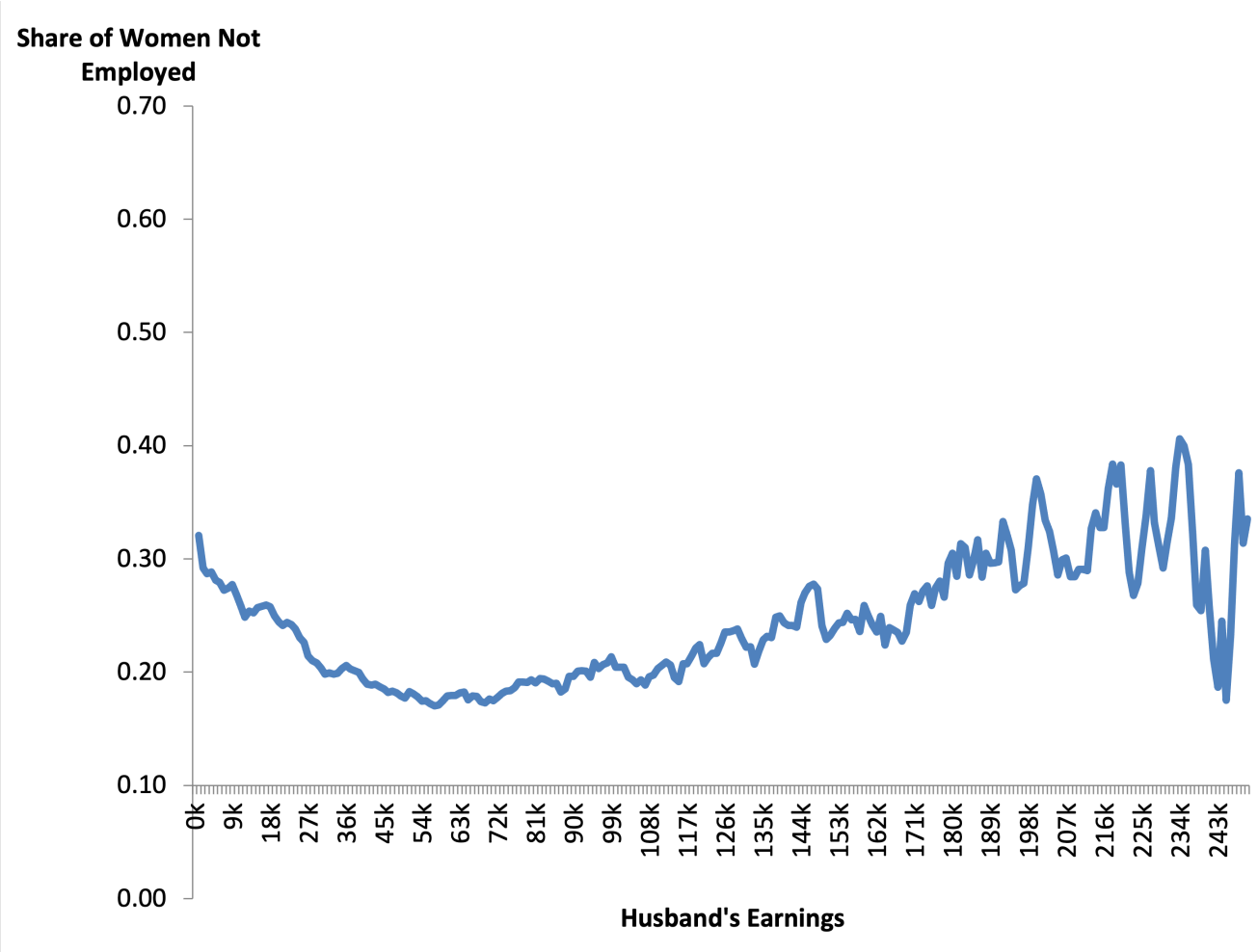
Average Tax Rates: Canada

Married Women Not Employed, by Husband's Earnings



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Participation responses to temp. wage shocks

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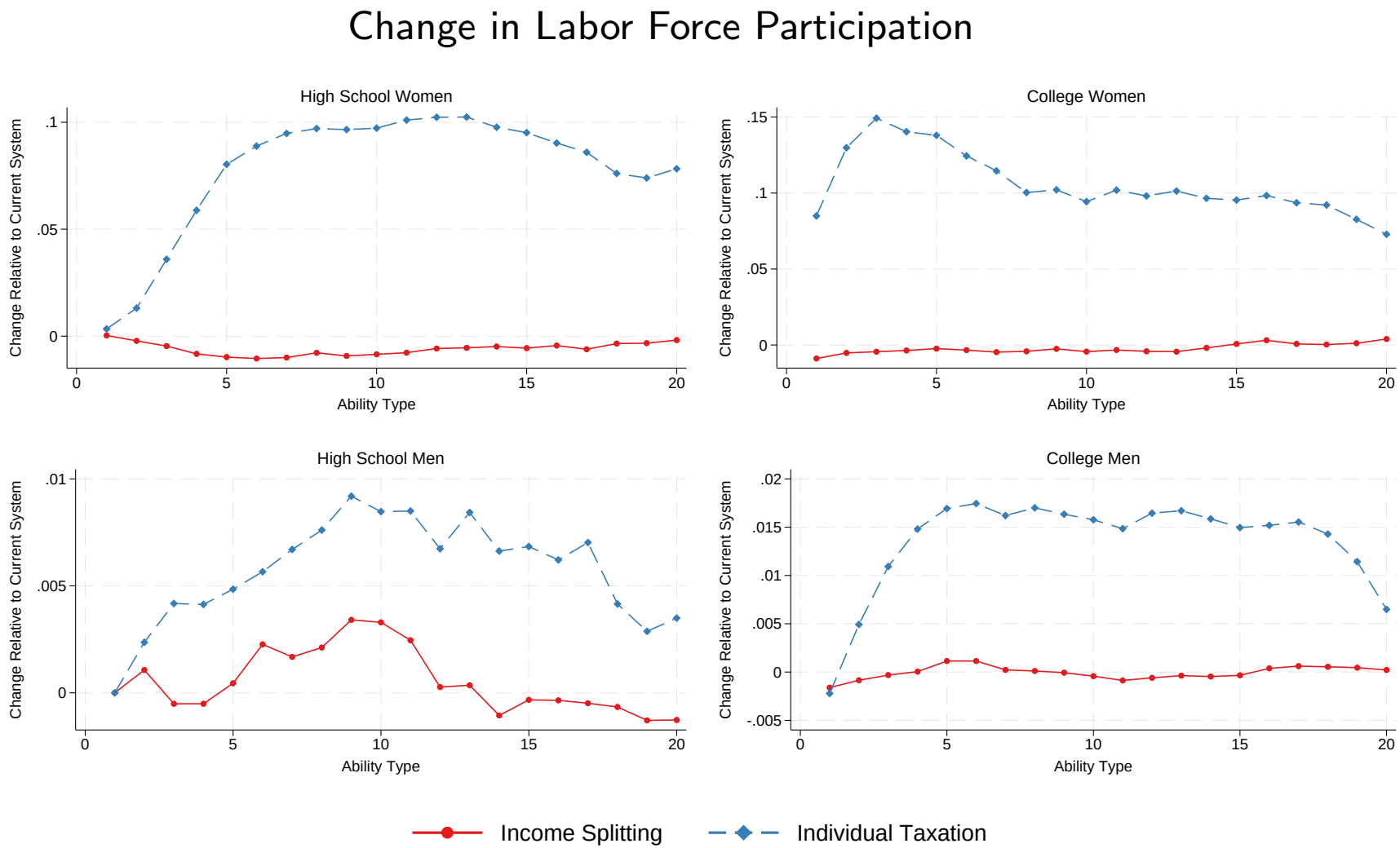
	All	Single	Married	
			No yng. ch.	With yng. ch.
Panel A: All women				
Log wage temporary shock	0.580	0.585	0.562	0.633
Constant	0.712	0.718	0.736	0.590
Panel B: Women, less than college				
Log wage temporary shock	0.671	0.693	0.630	0.723
Constant	0.683	0.673	0.727	0.553
Panel C: Women, college				
Log wage temporary shock	0.421	0.321	0.468	0.507
Constant	0.780	0.864	0.753	0.658
Panel D: All men				
Log wage temporary shock	0.301	0.416	0.191	0.212
Constant	0.879	0.821	0.938	0.909
Panel E: Men, less than college				
Log wage temporary shock	0.351	0.484	0.194	0.282
Constant	0.856	0.792	0.934	0.882
Panel F: Men, college				
Log wage temporary shock	0.211	0.267	0.186	0.0969
Constant	0.930	0.904	0.945	0.968

Labor force participation responses



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Policy Results: Optimal General Joint System

- Higher levels of redistribution without adversely affecting low-ability women

	Income change						
	0-4.5	4.5-10.8	10.8-31	31-57	57-85	85-148	148-296
Marginal tax rates for single individuals							
	0.0%	33.1%	33.4%	46.9%	55.9%	59.6%	65.2%
Marginal tax rates for married individuals, by income of the spouse							
0	**0.0%**	**0.0%**	**5.6%**	**8.5%**	**27.4%**	**38.1%**	**36.0%**
4.5	*11.0%*	**0.0%**	**7.7%**	**8.8%**	**28.4%**	**38.1%**	**36.2%**
10.8	*11.0%*	*9.4%*	**8.3%**	**11.0%**	**30.8%**	**37.8%**	**36.1%**
31	*20.6%*	*11.3%*	*31.0%*	**7.4%**	**36.4%**	**33.8%**	**37.7%**
57	*22.4%*	*20.2%*	*26.4%*	*17.2%*	**36.4%**	**38.9%**	**39.4%**
85	*28.6%*	*31.2%*	*34.2%*	*17.2%*	*31.6%*	**40.5%**	**38.4%**
148	*28.8%*	*28.5%*	*21.6%*	*29.4%*	*35.1%*	*33.1%*	**36.0%**
296	*34.3%*	*27.3%*	*33.4%*	*38.5%*	*30.0%*	*27.5%*	*23.6%*
Income Equivalent							2.59%

Golosov and Krasikov (2023): *Under realistic assumptions, optimal tax rates for married individuals (...) remain lower than the tax rates for single individuals, and the marginal rates for one spouse increase (decrease) in the earnings of the other if both spouses have low (high) earnings.*

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What is the effect of dynamics and limited commitment?

- We reduce the standard deviation of match quality shocks by 50%
- This decreases the average probability of divorce by 24%
- We then re-derive the optimal rates and deduction for the income splitting system with deduction

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What is the effect of dynamics and limited commitment?

- The main effect is an increase in the degree of progressivity
- This is due to an increase in intra-household specialization

Bracket	Joint	Deduction	Deduction $0.5\sigma_\theta$
0-4.5k	0.0	0.0	0.0
4.5-10.75k	0.11	0.0	0.0
10.75-31k	0.19	0.25	0.24
31-57.25k	0.30	0.32	0.34
57.25-85.5k	0.33	0.37	0.39
85.5-149k	0.38	0.38	0.40
$>$149k	0.40	0.50	0.52
Optimal Deduction		\$9,134	\$9,382

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